

Disclaimer: Information contained in the report addresses environmental conditions only and is not the official South Florida Water Management District operations recommendation or decision.

## **M E M O R A N D U M**

**TO:** John Mitnik, Assistant Executive Director, Executive Office Staff

**FROM:** SFWMD Staff Environmental Advisory Team

**DATE:** December 16, 2020

**SUBJECT:** Weekly Environmental Conditions for Systems Operations

### **Summary**

#### **Weather Conditions and Forecast**

A weak stationary cold front extends from just north of West Palm Beach to the west-central coast of Florida. The weak frontal zone over the District is forecast to lift north of the area as a warm front, after which a stronger cold front is forecast to cross the Gulf of Mexico on Wednesday. A line or mass of moderately heavy or heavy rains associated with the front and a weak low-pressure area will spread across north Florida on Wednesday, with some of the rains eventually pushing into the far northwestern part of the District Wednesday afternoon and evening. In recent model runs there has been a trend for less rainfall over this region, although the model differences are still rather large and imply lower-than-average predictability for a day 2 forecast. Regardless, the front's upper-level support should lift away from the area Wednesday evening, causing any rains over the northwestern half of the District to quickly diminish before the front shifts southeastward to just northwest of Lake Okeechobee around daybreak on Thursday. Showers, some moderately heavy, and an isolated thunderstorm or two are likely Thursday morning and afternoon over the southeastern half of the District ahead of the front. These rains should shift offshore the southeast coast of Florida, with a drier and much cooler air mass filtering southward across Florida Thursday night and Friday. The dry conditions are likely to continue through at least early Sunday while temperatures gradually rebound. Another cold front is likely to approach the District late Sunday or Monday next week and could help to produce an increase of rains across the area, followed by another cooling. However, considerable model differences make it difficult to produce a skillful rainfall forecast on either day at this time.

#### **Kissimmee**

Tuesday morning stages were 58.0 feet NGVD (at schedule) in East Lake Toho, 55.0 feet NGVD (at schedule) in Toho, and 52.3 feet NGVD (0.2 feet below schedule) in Kissimmee-Cypress-Hatchineha; headwater stages were 46.3 feet NGVD at S-65A and 26.3 feet NGVD at S-65D. Tuesday morning discharges were 910 cfs at S-65, 1,070 cfs at S-65A, 1,780 cfs at S-65D and 1,970 cfs at S-65E. Dissolved oxygen concentration in the Kissimmee River averaged 7.2 mg/L for the week through Sunday. Kissimmee River mean floodplain depth on Sunday was 1.06 feet. Today's recommendation is to slowly reduce discharge at S-65/S-65A to be less than 800 cfs by the week of December 20, 2020. The purpose is to allow for 2-3 weeks with flow below 800 cfs before construction in Pool D resumes in early January 2021.

## **Lake Okeechobee**

Lake Okeechobee stage was 15.99 feet NGVD on December 13, 2020, 0.04 feet higher than last week and 0.46 feet lower than a month ago. The Lake is currently in the Low Sub-band. Stage has been above or near the top of the preferred ecological envelope since August 1, 2020 and is currently 0.49 feet above. Wading bird monitoring for the 2021 breeding season began in early December and 3,500 foraging birds were observed, more than expected given relatively high lake stages. Recent satellite imagery suggests little to no bloom potential on the Lake.

## **Estuaries**

Total inflow to the St. Lucie Estuary averaged more than 1,739 cfs with approximately 944 cfs coming from Lake Okeechobee. The seven-day average surface salinities increased throughout the estuary over the past week. Salinity at the US1 Bridge is in the fair range (5-10) for adult eastern oysters. Total inflow to the Caloosahatchee Estuary averaged 5,204 cfs over the past week with approximately 2,752 cfs coming from the Lake. Seven-day average surface salinities remained almost fresh (0.2) at the three most upstream sites (S-79, Val I75 and Ft. Myers Yacht Basin), decreased slightly at Cape Coral, and increased downstream over the past week. Salinities are in the good range (0-10) for tape grass at Val I-75 and Ft. Myers. Salinities are in the good range (10-30) for adult eastern oysters at Shell Point and Sanibel, and in the poor range (0-5) at Cape Coral. Lake stage is in the Low Sub-Band of 2008 LORS. Tributary hydrological conditions are wet. The LORS2008 Release Guidance suggests up to 450 cfs release at S-79 to the Caloosahatchee Estuary and up to 200 cfs release at S-80 to the St. Lucie Estuary.

## **Stormwater Treatment Areas**

Over the past week, 1,100 ac-feet of Lake Okeechobee water was delivered to the FEBs/STAs. The total amount of lake releases sent to the FEBs/STAs in WY2021 (since May 1, 2020) is approximately 96,200 ac-feet. The total amount of inflows to the STAs in WY2021 is approximately 1,491,000 ac-feet. Most STA cells are near or above target stage. STA-1E Western Flow-way is offline for the Restoration Strategies project to fill and grade Cells 5 and 7, and STA-2 Flow-way 2 is offline for construction activities. Operational restrictions are in place in STA-1W Western, Eastern, and Northern Flow-ways due to discharge canal plug construction activities, in STA-1E Central Flow-way, STA-2 Flow-way 3, STA-2 Flow-way 4, STA-3/4 Eastern, Central, and Western Flow-ways for vegetation management activities, and in STA-5/6 Flow-ways 2 and 3 following the Restoration Strategies project to grade non-effective treatment areas. This week, if 2008 LORS recommends Lake releases to the WCAs and conditions allow, releases will be sent to STA-2.

## **Everglades**

WCA-1 is at schedule and WCA-2A and 3A are well above schedule. At the gauges monitored for this report, WCA-1 is around 0.70 feet, eastern WCA-2A is 1.10 feet, WCA-3A North is 1.75 feet, and WCA-3A South is around 1.70 feet above the mean stage at those locations for this time of year. Very few wading birds were detected in the central Everglades. Tens of thousands of wading birds (birds of all types) were observed foraging along the southern coastal margins and creeks particularly around Flamingo. In Big Cypress, 9,000 White Ibis and Egrets were noted foraging. Some mixed flocks were noted in northwestern WCA-3A. Taylor Slough stages increased slightly last week, associated with the highest areas of rainfall. Salinities increased on average across Florida Bay, responding to reduced freshwater input. Salinity at the Taylor River station in the mangrove zone to the east remains near fresh. Flows are gradually decreasing but remain positive, and the long-term average remains historically high.

## Supporting Information

### KISSIMMEE BASIN

#### Rainfall

The Upper Kissimmee Basin received 0.03 inches of rainfall in the past week, and the Lower Basin received 0.10 inches (SFWMD Daily Rainfall Report 12/14/2020).

#### Upper Kissimmee

**Table 1** lists stage and discharge for several KCL water bodies using data from lake outfall structures. KCL stage hydrographs with respective regulation schedules and rainfall are shown in **Figures 1-3**.

**Table 1.** Average discharge (cfs) for the preceding seven days, stage (feet NGVD), and departures from KCL flood regulation (R) or temporary schedules (T, A, or S); provisional, real-time data are from SFWMD.

**Report Date: 12/15/2020**

Water Body	Structure	7-day Average Discharge (cfs) <sup>1</sup>	Stage Monitoring Site <sup>2</sup>	Lake Stage (feet)	Schedule Type <sup>3</sup>	Schedule Stage (feet)	Daily Departure (feet)						
							12/13/20	12/6/20	11/29/20	11/22/20	11/15/20	11/8/20	11/1/20
Lakes Hart and Mary Jane	S-62	19	LKMJ	61.1	R	61.0	0.1	-0.1	0.0	0.1	0.1	-0.1	0.0
Lakes Myrtle, Preston, and Joel	S-57	27	S-57	61.9	R	61.9	0.0	-0.1	0.0	0.1	0.0	-0.1	0.0
Alligator Chain	S-60	53	ALLI	64.0	R	64.0	0.0	0.0	0.1	0.1	0.1	-0.1	-0.3
Lake Gentry	S-63	45	LKGT	61.6	R	61.5	0.1	-0.1	0.1	0.1	0.0	0.0	-0.1
East Lake Toho	S-59	77	TOHOE	57.9	R	58.0	-0.1	0.0	0.0	0.0	0.1	0.0	-0.1
Lake Toho	S-61	158	TOHOW, S-61	55.0	R	55.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.2
Lakes Kissimmee, Cypress, and Hatchineha	S-65	1,382	KUB011, LKIS5B	52.5	R	52.5	0.0	0.2	0.3	0.4	0.4	0.0	-0.1

<sup>1</sup> Seven-day average of weighted daily means through midnight.

<sup>2</sup> Names of in-lake monitoring sites and structures used to determine lake stage; if more than one site is listed, an average is reported.

<sup>3</sup> A = projected ascension line, R = USACE regulation schedule, S = temporary recession target line, T = temporary schedule, N/A= not applicable or data not available.

DATA ARE PROVISIONAL

## Lower Kissimmee

Discharges at lower basin structures are shown in **Table 2**. **Figure 4** compares floodplain inundation depths from one year and one month ago with current inundation depths in the Phase I restored area of the Kissimmee River. **Figure 5** shows dissolved oxygen concentration along with S-65A discharge, water temperature, and rainfall. **Figures 6-8** are included for reference. **Figure 6** is the current guide for operation of S-65 and S-65A, called the “Preferred Discharge Plan IS-14-50.0”. This is developed collaboratively each year between ecologists and SFWMD water managers based on prevailing ecological and hydrologic conditions. A preferred discharge plan and the interim regulation schedule (**Figure 7**) will be used until the Headwaters Lakes Revitalization regulation schedule is implemented. **Figure 8** is a map of the Kissimmee Basin showing Central and Southern Florida (C&SF) flood control project structures and color-coded watersheds.

**Table 2.** One- and seven-day average discharge at lower basin structures, dissolved oxygen concentration in phases I and II/III area river channel, and depth in the Phase I area floodplain using provisional, real-time data from SFWMD.

Report Date: 12/15/2020

Metric	Location	1-Day Average	Average for the Preceding 7-Days <sup>1</sup>								
		12/13/2020	12/13/20	12/6/20	11/29/20	11/22/20	11/15/20	11/8/20	11/1/20	10/25/20	10/18/20
Discharge (cfs)	S-65	1,108	1,382	1,083	842	784	385	187	209	180	678
Discharge (cfs)	S-65A <sup>2</sup>	1,261	1,566	1,275	1,108	1,095	724	361	330	346	861
Discharge (cfs)	S-65D <sup>2</sup>	1,709	1,605	1,497	1,541	1,685	1,590	797	1,122	1,714	3,267
Headwater Stage (feet NGVD)	S-65D <sup>2</sup>	26.29	26.40	26.82	26.99	26.98	27.03	26.94	27.35	27.62	27.66
Discharge (cfs)	S-65E <sup>2</sup>	1,764	1,687	1,545	1,657	1,835	1,904	895	1,283	1,935	3,501
Discharge (cfs)	S-67	0	0	0	0	0	0	0	0	0	0
DO (mg/L) <sup>3</sup>	Phases I & II/III river channel	7.0	7.2	6.0	5.3	4.7	5.2	5.6	3.8	3.0	1.5
Mean depth (feet) <sup>4</sup>	Phase I floodplain	1.06	1.01	0.90	0.93	0.94	0.75	0.52	0.67	0.90	1.66

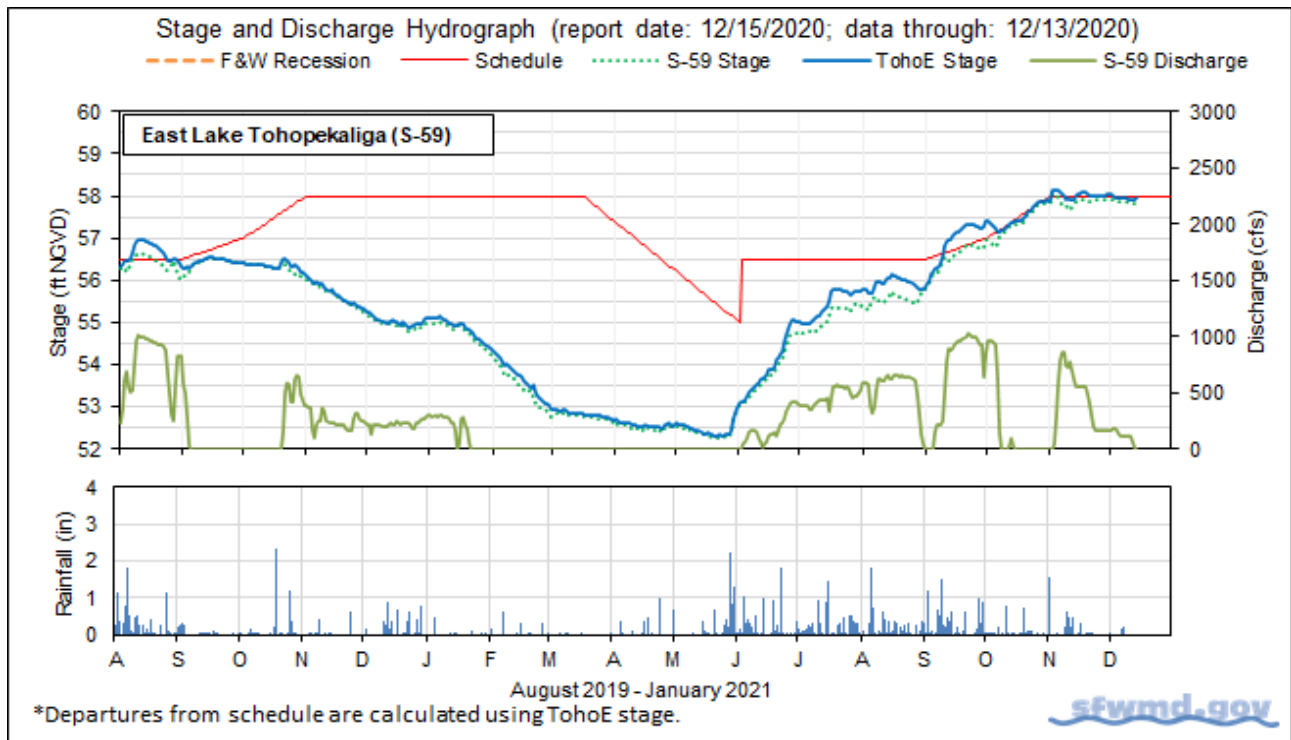
<sup>1</sup>Seven-day average of weighted daily means through Sunday midnight.

<sup>2</sup>S-65A discharge combines S-65A with auxiliary structures; S-65D discharge combines discharge at S-65D, S-65DX1, and S-65DX2; S-65D stage averages stage at S-65D and S-65DX1; S-65E discharge combines S-65E and S-65EX1.

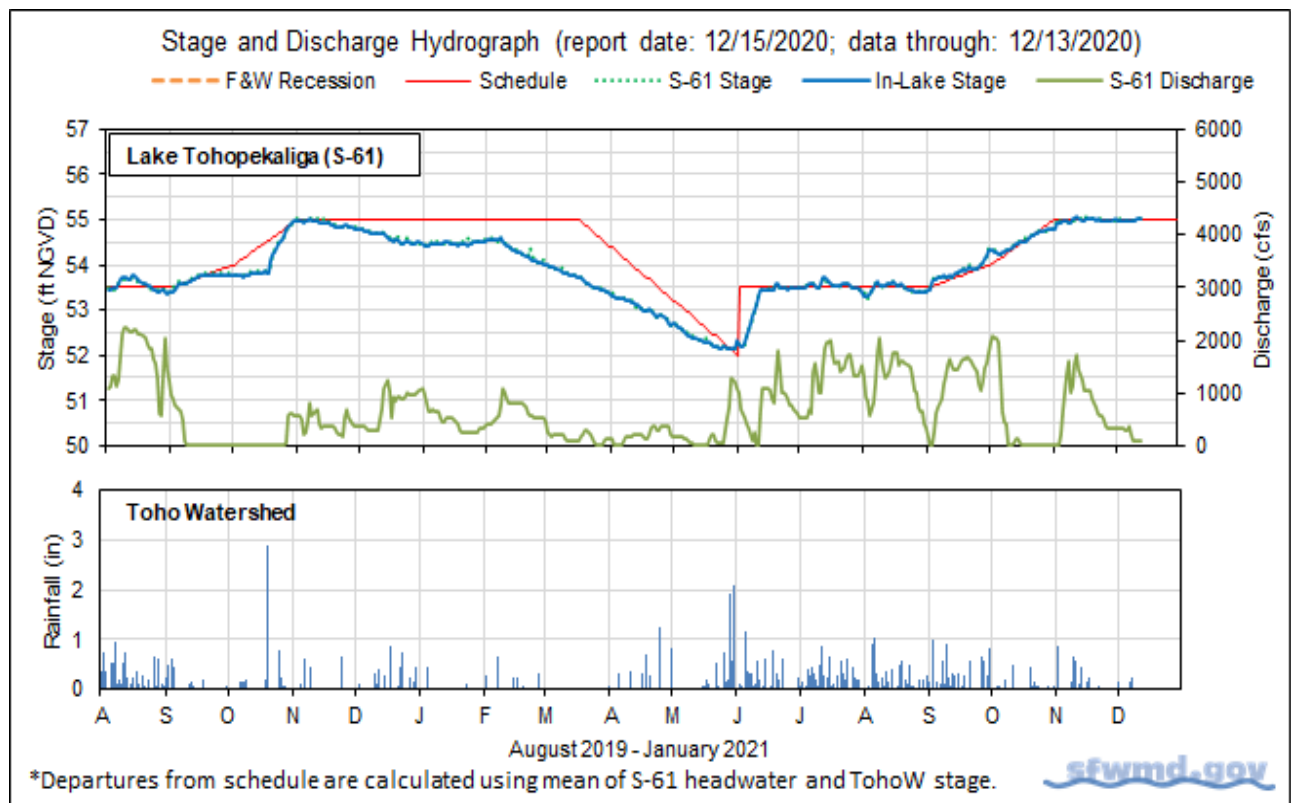
<sup>3</sup>DO is the average for sondes at KRBN, PC62, PC33, PD62R, and PD42R.

<sup>4</sup>1-day spatial average from South Florida Water Depth Assessment Tool (SFWDAT).

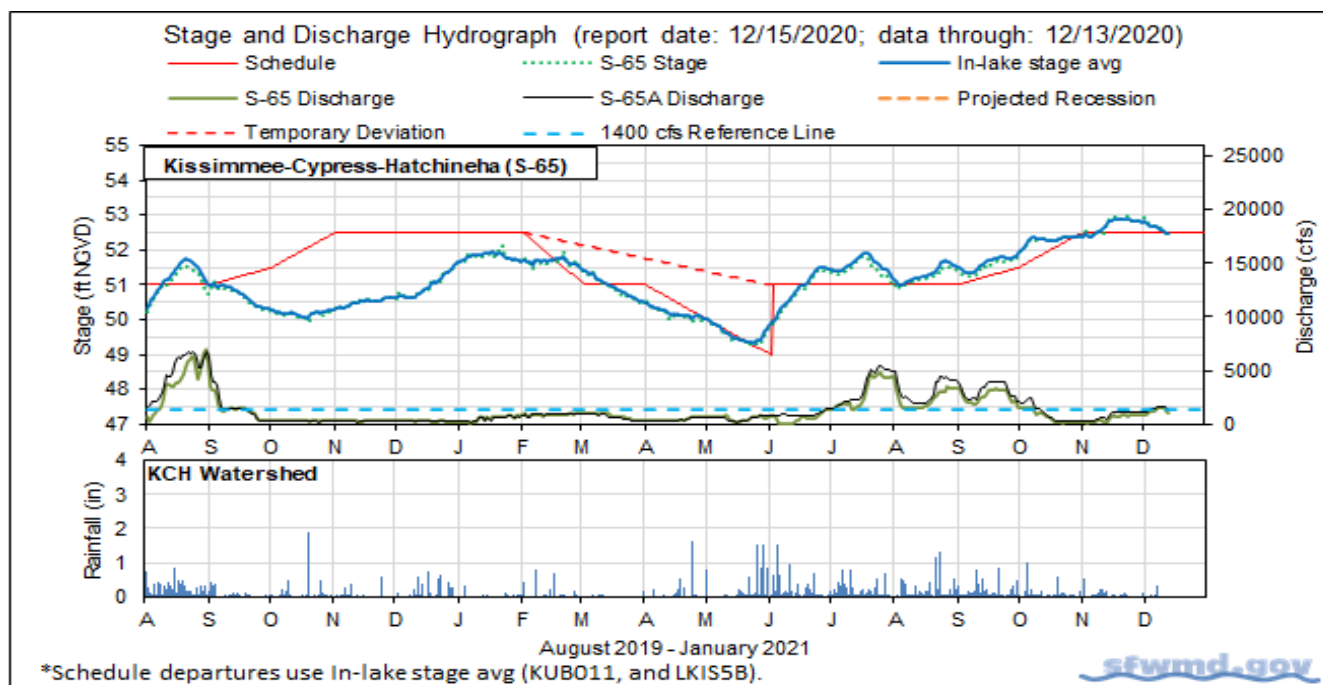
DATA ARE PROVISIONAL; N/A indicates that data were not available.



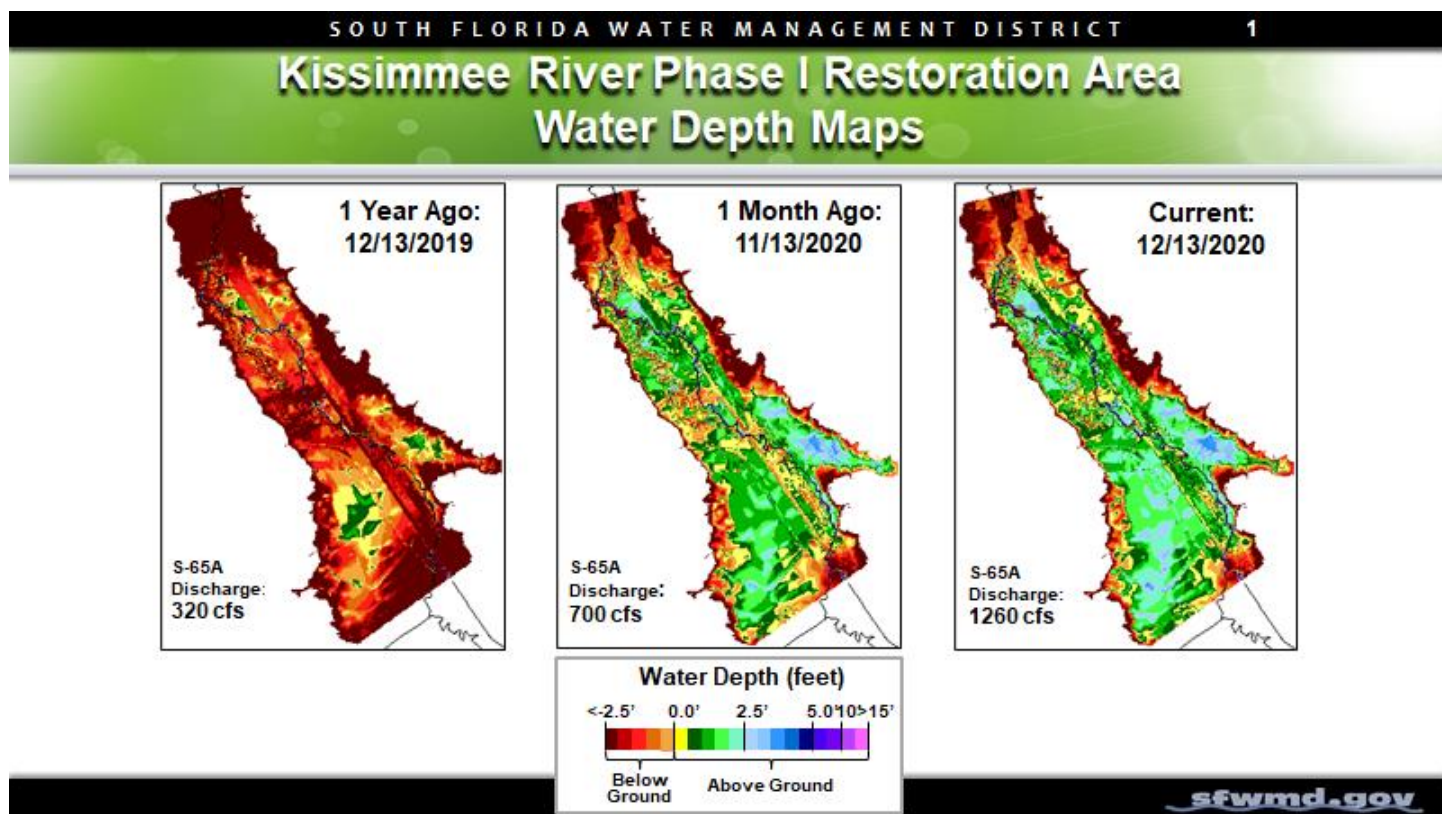
**Figure 1.** East Lake Toho regulation schedule, stage, discharge and rainfall.



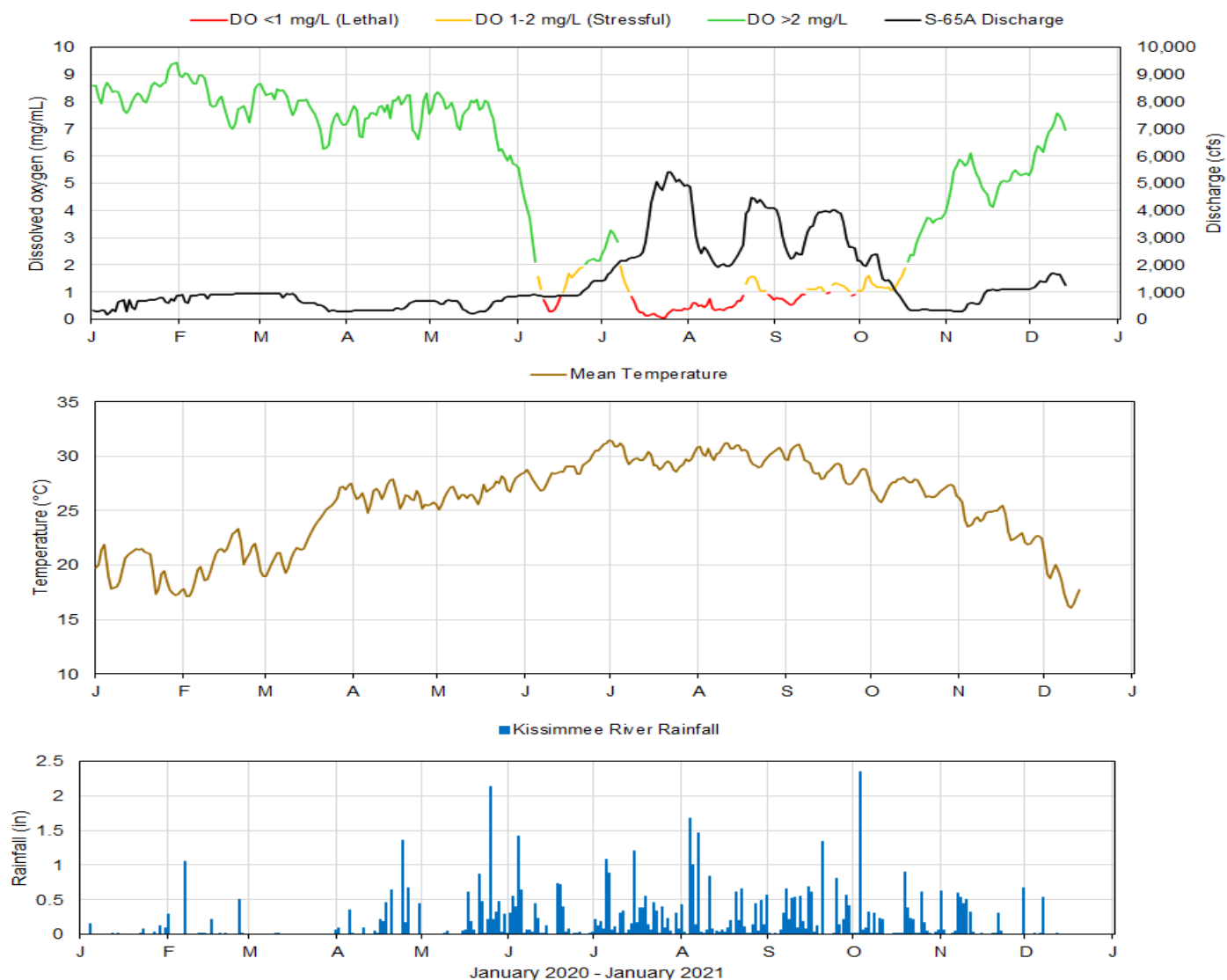
**Figure 2.** Lake Toho regulation schedule, stage, discharge and rainfall.



**Figure 3.** Lakes Kissimmee, Cypress and Hatchineha regulation schedule, stage, discharge and rainfall.



**Figure 4.** Phase I area floodplain water depths (from left to right) one year ago, one month ago and current. Color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to January 16, 2012.



Dissolved oxygen (DO) and temperature are mean daily values averaged for PC62, KRBN, PC33, PD62R and PD42R with an average of 3 stations reporting this week. Rainfall values are daily totals for Kissimmee River (Pool BCD) AHED watershed.  
 Report Date: 12/15/2020; data are through: 12/13/2020

[sfwmd.gov](http://sfwmd.gov)

**Figure 5.** Restored Kissimmee river channel mean daily dissolved oxygen concentration (mg/L), S-65A discharge (cfs), temperature (°C) and rainfall (inches)



## Stage and Discharge Guidance for 2019-2020.

Zone	KCH Stage (ft NGVD)	S-65/S-65A Discharge*
A	Above regulation schedule line.	Flood control releases as needed with no limits on the rate of discharge change.
B1	In flood control buffer zone (0.5 ft below the schedule line).	Adjust S-65 discharge so that S-65A discharge is between 1400 cfs at the buffer zone line and 3000 cfs at the schedule line.
B2	Between the Flood Control Buffer and the 50.0 ft line.	Adjust S-65 discharge to maintain at least 1400 cfs at S-65A. Use $\pm 0.2$ ft buffer (gray band) above and below the 50.0 ft line to decide when to begin ramping up to 1400 cfs or down to 300 cfs; do not continue reducing discharge if stage rises back to or above the threshold stage line.
B3	Between the 50.0 ft line and 49 ft.	Adjust S-65 discharge to maintain at least 300 cfs at S-65A.
B4	Between 48.5 ft to 49 ft.	Adjust S-65 discharge to maintain S-65A discharge between 0 cfs at 48.5 ft and 300 cfs at 49 ft.
C	Below 48.5 ft.	0 cfs.

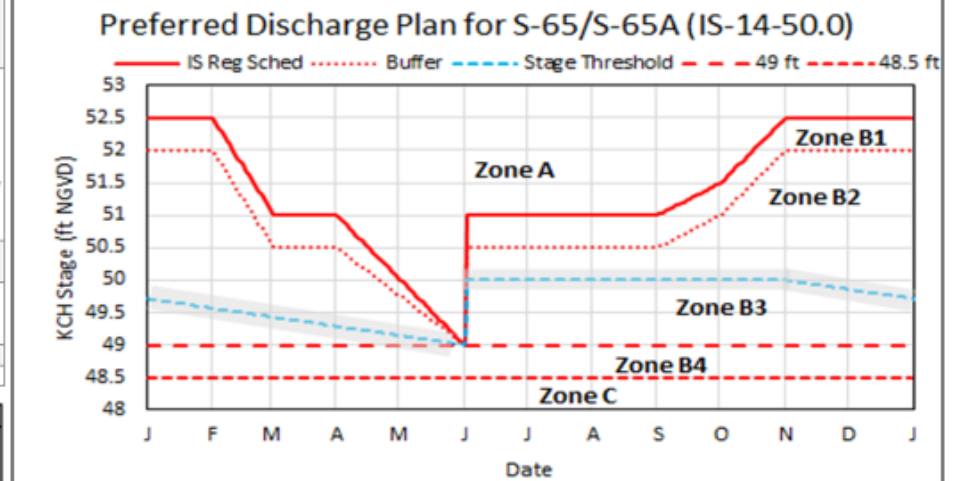
\*Changes in discharge should not exceed limits in inset table below.

## Discharge Rate of Change Limits for S65/S65A (revised 7/13/18).

Q (cfs)	Maximum rate of increase (cfs/day)	Maximum rate of decrease (cfs/day)
0-300	50	-50
301-650	75	-75
651-1400	150	-150
1401-3000	300	-600
>3000	1000	-2000

Revised 5/16/2019

## 2019-2020 Discharge Plan S-65/S65A



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Figure 6. The 2019-2020 Discharge Plan for S-65/S-65A.

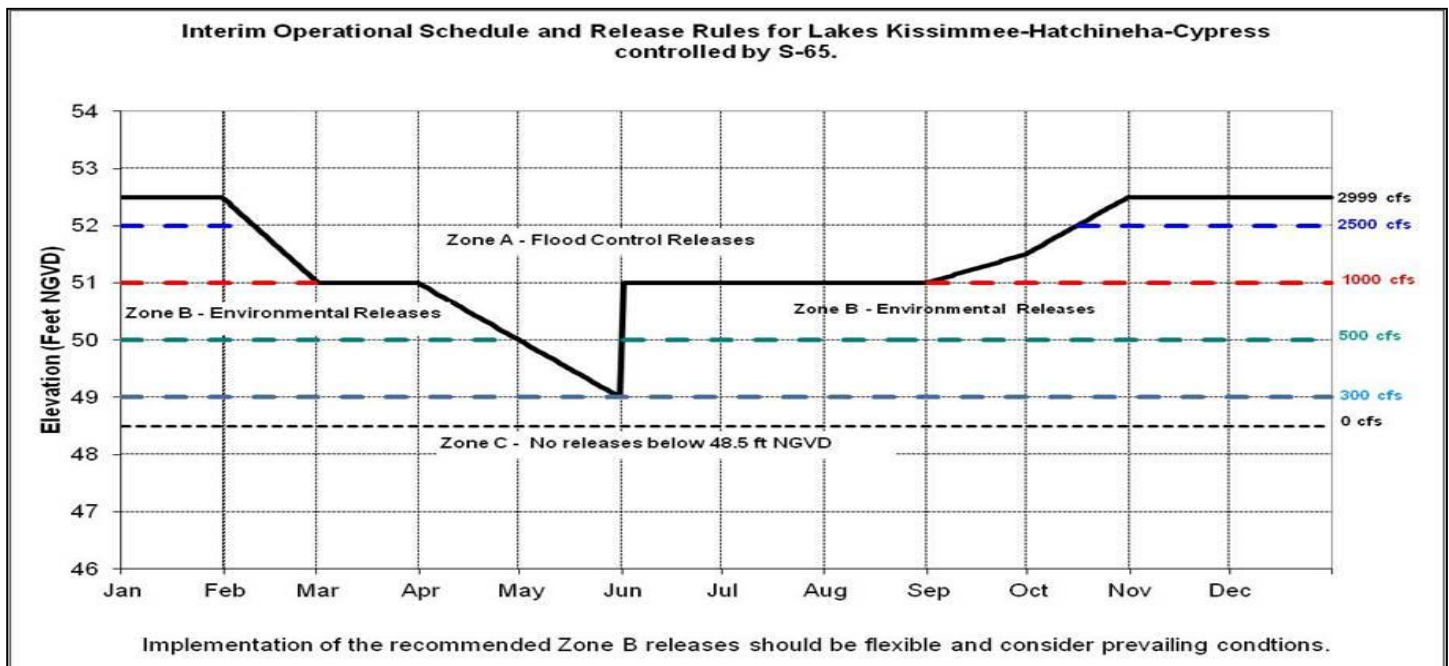


Figure 7. Interim operations schedule for S-65 (solid black line). The discharge schedule shown to the right has not been used in recent years.



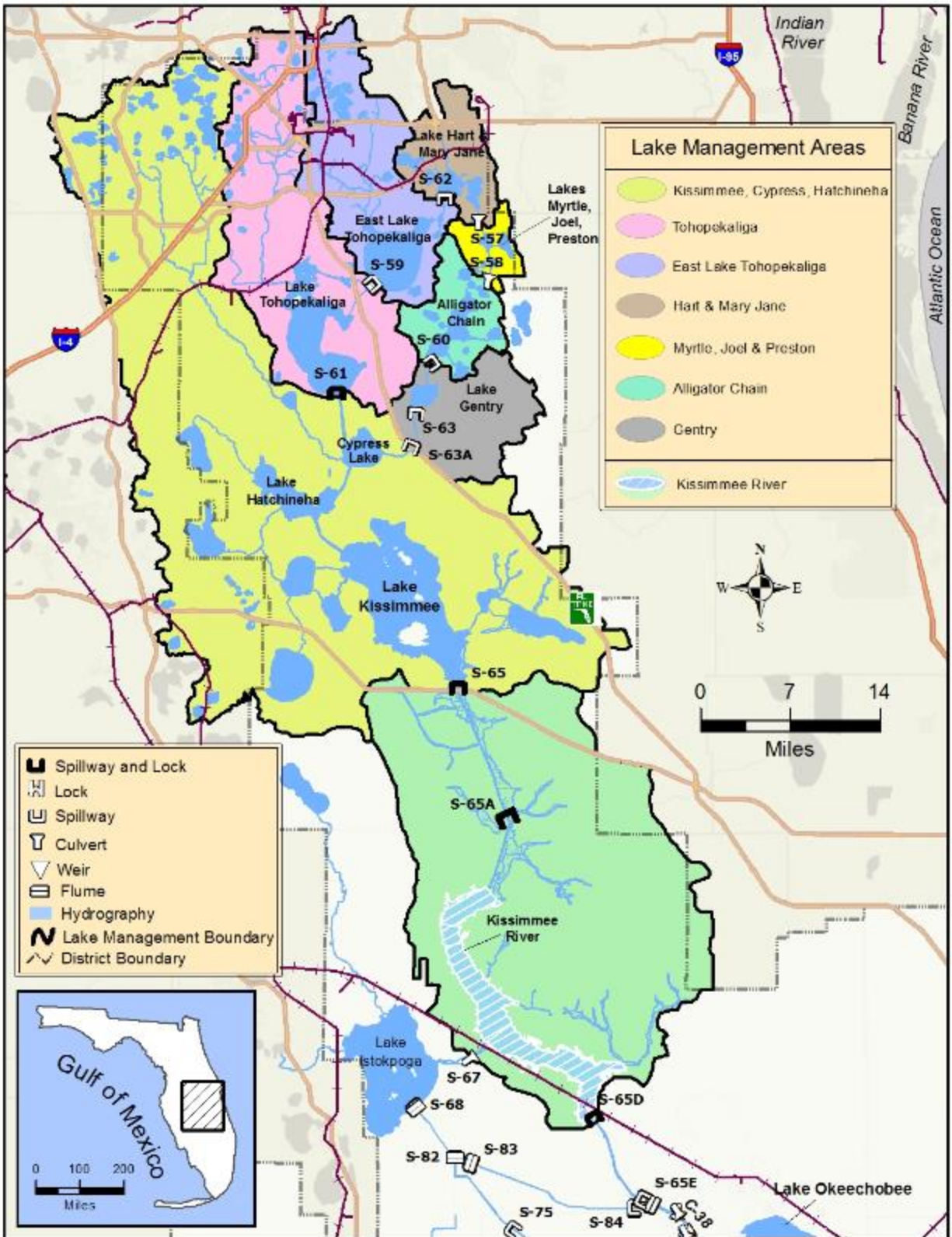


Figure 8. The Kissimmee Basin.

## **LAKE OKEECHOBEE**

Lake Okeechobee stage is 15.99 feet NGVD, 0.46 feet lower than a month ago, and 2.98 feet higher than one year ago (**Figure 1**). Lake stages rose into the lower portion of the preferred ecological envelope on June 2, 2020 (**Figure 2**) but have been above the envelope since August 1, 2020; currently 0.49 feet above. Lake stage reached a low of 10.99 feet on May 17 and a high of 16.45 feet on November 12 (post Tropical Storm Eta), a difference of 5.5 feet (**Figure 3**). Lake stage has declined since mid-November and is currently in the Low sub-band. According to RAINDAR, approximately 0.08 inches of rain fell on the Lake last week. Nearly all the watershed received similar amounts of rainfall, between 0 and 0.10 inches (Figure 4).

Average daily inflows (excluding rainfall) were higher than the previous week, going from 2,718 cfs to 3,087 cfs. Outflows (excluding evapotranspiration) decreased from 5,120 cfs to 3,961 cfs. Most of the inflows came from the Kissimmee River (1,684 cfs through S-65E & S-65EX1) and the C-41A canal (519 cfs through S-84 & S-84X) combined. Releases to the west via S-77 and east via S-308 both decreased from last week, going from 3,760 cfs to 2,898 cfs at S-77 and from 1,245 cfs to 972 cfs at S-308. Average inflows and outflows through water control structures surrounding the Lake for the previous two weeks (cfs) are shown in Table 1. The resultant lake elevation change (in) due to each structure's flow for the past week is also shown in Table 1. Figure 5 shows the combined average daily cfs for inflows and outflows for the Lake over the past eight weeks. These data are provisional and are subject to change.

The first wading bird survey of the 2021 breeding season (conducted December 3, 2020) reported over 3,500 foraging wading birds on the lake, compared to about 700 at the same time last year when lake stages were about 1.5 feet below the ecological envelope for the second year in a row (**Figure 6**). Higher lake stages throughout the summer and fall of 2020 likely sparked prey production in the marsh, leading to more wading bird foraging activity on this survey than would be expected at nearly 16 feet in lake stage. Most of the wading birds were seen using vegetation to forage from in deeper areas, with very few species observed that tend to rely on shallow areas (e.g. white ibis). Lake stages near the top of the ecological envelope throughout the spring should provide good conditions for wading bird nesting this breeding season.

The most recent satellite image (December 13, 2020) from the NOAA cyanobacteria monitoring product derived from EUMETSAT's Sentinel 3 OLCI sensor data showed continued low bloom potential on the Lake (**Figure 7**).

## **Water Management Summary**

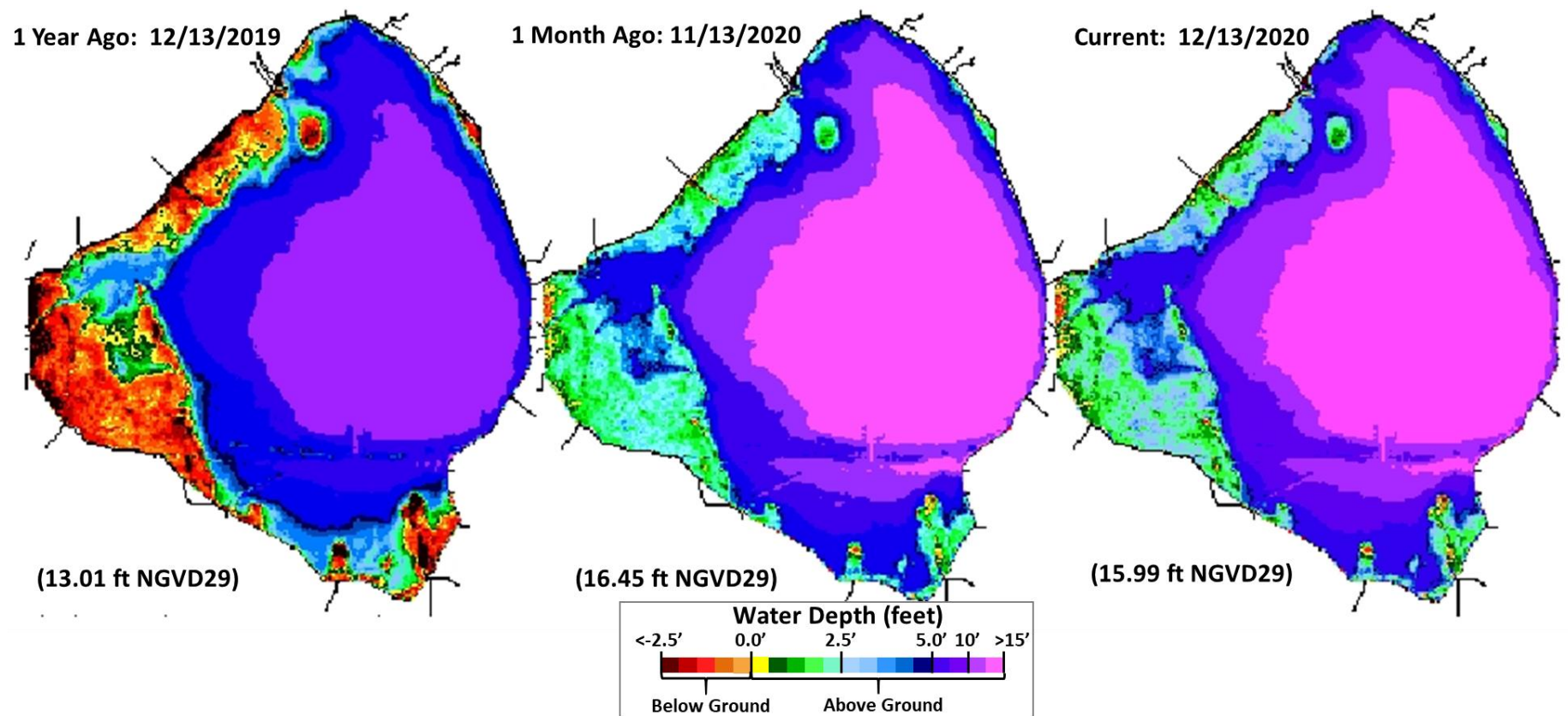
Lake Okeechobee stage was 15.99 feet NGVD on December 13, 2020, 0.04 feet higher than last week and 0.46 feet lower than a month ago. The Lake is currently in the Low Sub-band. Stage has been above or near the top of the preferred ecological envelope since August 1, 2020 and is currently 0.49 feet above. Wading bird monitoring for the 2021 breeding season began in early December, and 3,500 foraging birds were observed, more than expected given relatively high lake stages. Recent satellite imagery suggests little to no bloom potential on the Lake.

**Table 1.** Average daily inflows and outflows for the most recent two weeks and approximate depth equivalents on Lake Okeechobee for various structures.

INFLOWS	Previous week Avg Daily CFS	Avg Daily Flow cfs	Equivalent Depth Week Total (in)
S-65E & S-65EX1	1546	1684	0.6
S-71 & S-72	218	305	0.1
S-84 & S-84X	548	519	0.2
Fisheating Creek	142	127	0.0
S-154	44	37	0.0
S-191	0	0	0.0
S-133 P	48	74	0.0
S-127 P	23	26	0.0
S-129 P	12	18	0.0
S-131 P	4	7	0.0
S-135 P	133	160	0.1
S-2 P	0	0	0.0
S-3 P	0	0	0.0
S-4 P	0	73	0.0
L-8 Backflow	1	57	0.0
Rainfall	215	215	0.1
<b>Total</b>	<b>2933</b>	<b>3302</b>	<b>1.3</b>

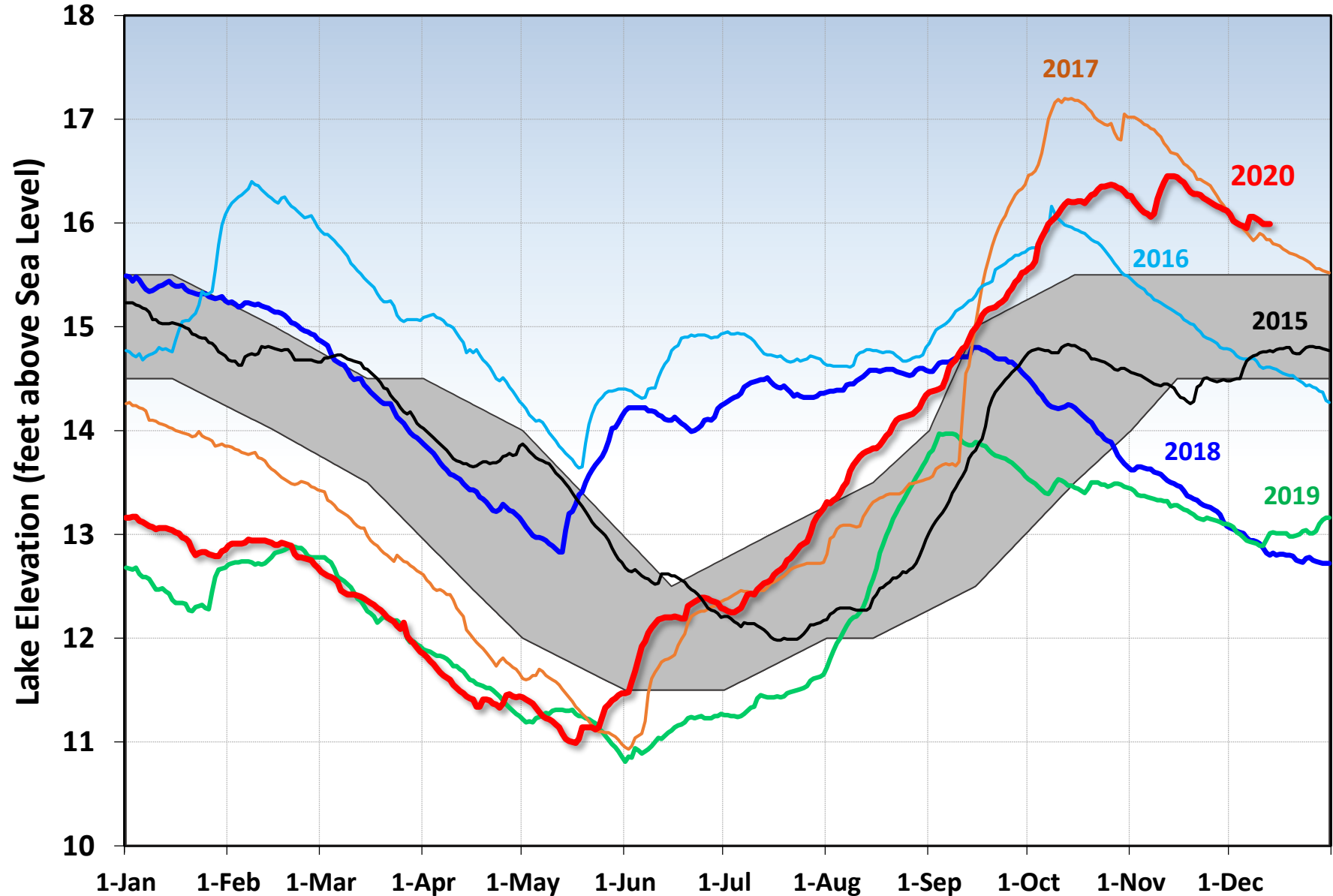
OUTFLOWS	Previous week Avg Daily CFS	Avg Daily Flow cfs	Equivalent Depth Week Total (in)
S-77	3760	2898	1.1
S-308	1245	972	0.4
S-351	68	91	0.0
S-352	33	0	0.0
S-354	14	0	0.0
L-8 Outflow			
ET	1392	1908	0.7
<b>Total</b>	<b>6513</b>	<b>5869</b>	<b>2.2</b>

Provisional Data



**Figure 1.** Water depth estimates on Lake Okeechobee based on the South Florida Water Depth Assessment Tool.

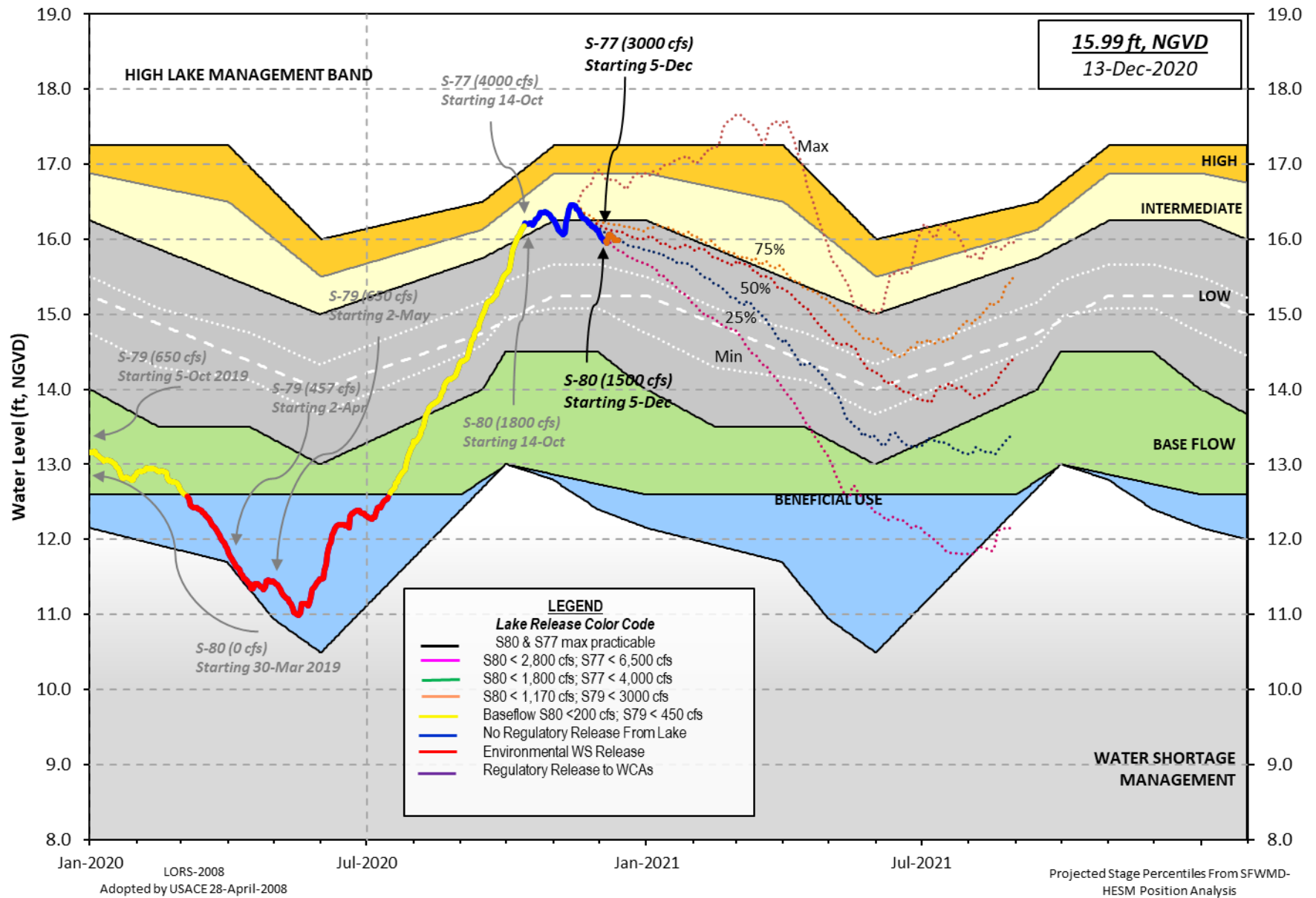
## Lake Okeechobee Stage vs Updated Ecological Envelope



**Figure 2.** Select annual stage hydrographs for Lake Okeechobee in comparison to the updated Ecological Envelope.



## Lake Okeechobee Water Level History and Projected Stages



**Figure 3.** Recent Lake Okeechobee stage and releases, with projected stages based on a dynamic position analysis.



SFWMD PROVISIONAL RAINDAR 7-DAY BASIN RAINFALL ESTIMATES  
FROM: 0700 EST, 12/07/2020 THROUGH: 0700 EST, 12/14/2020

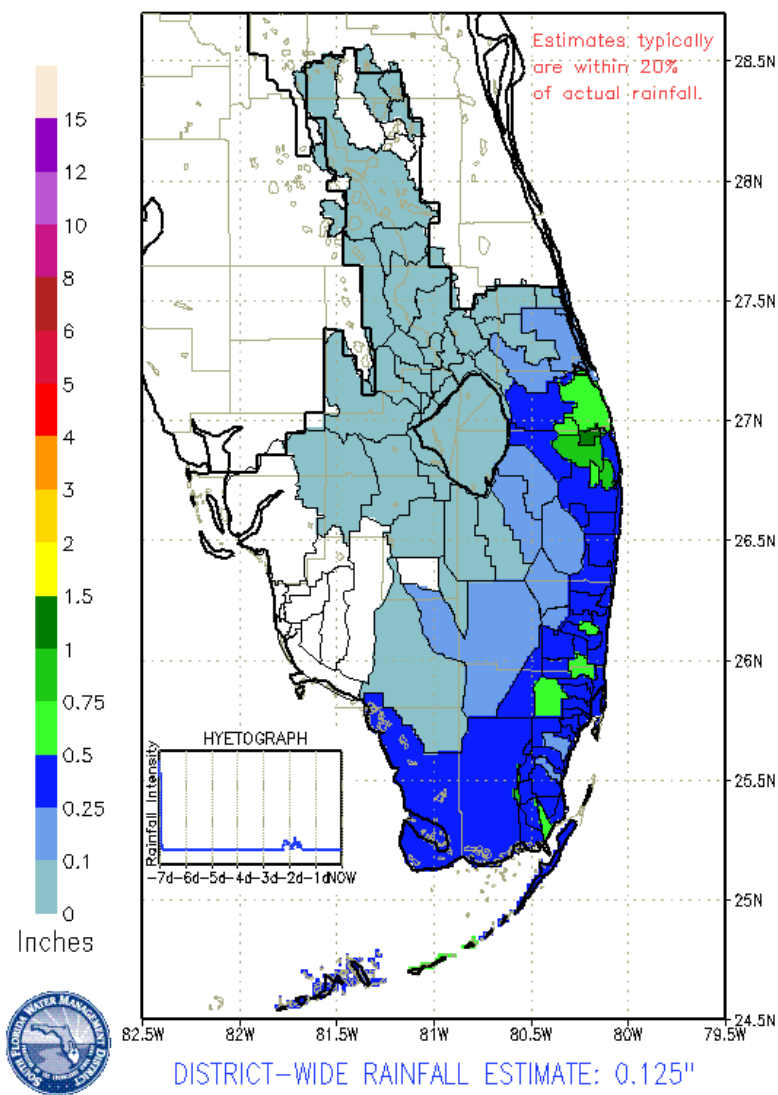


Figure 4. 7-Day rainfall estimates by RAINDAR.

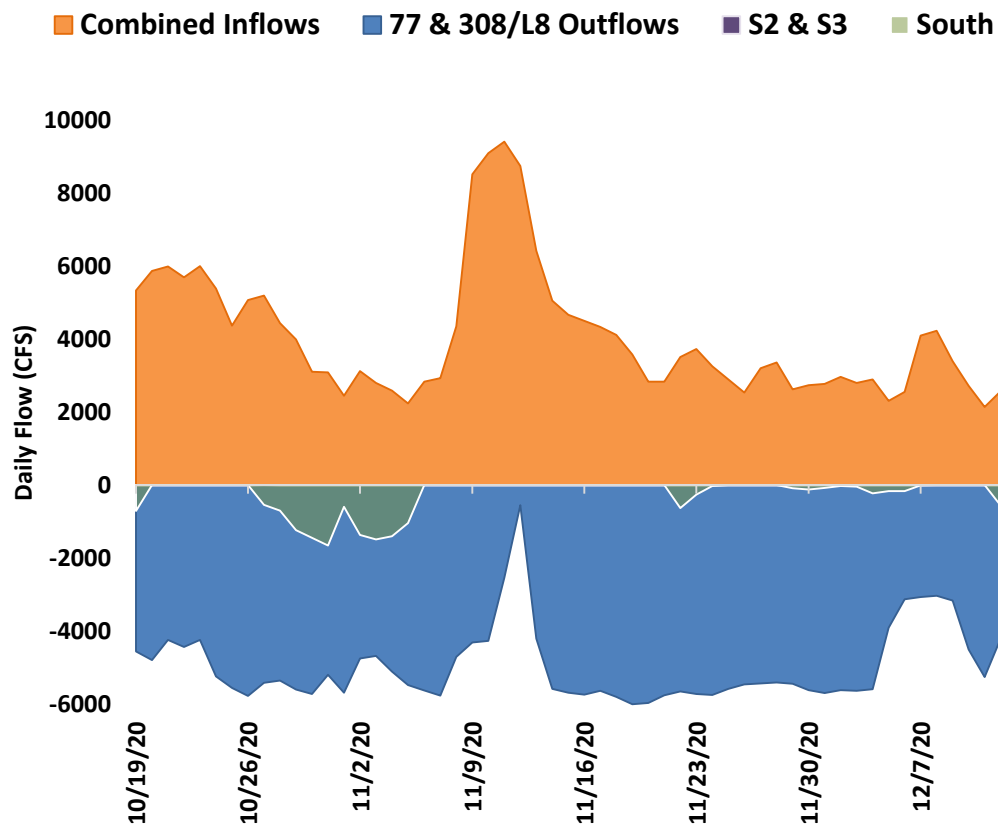
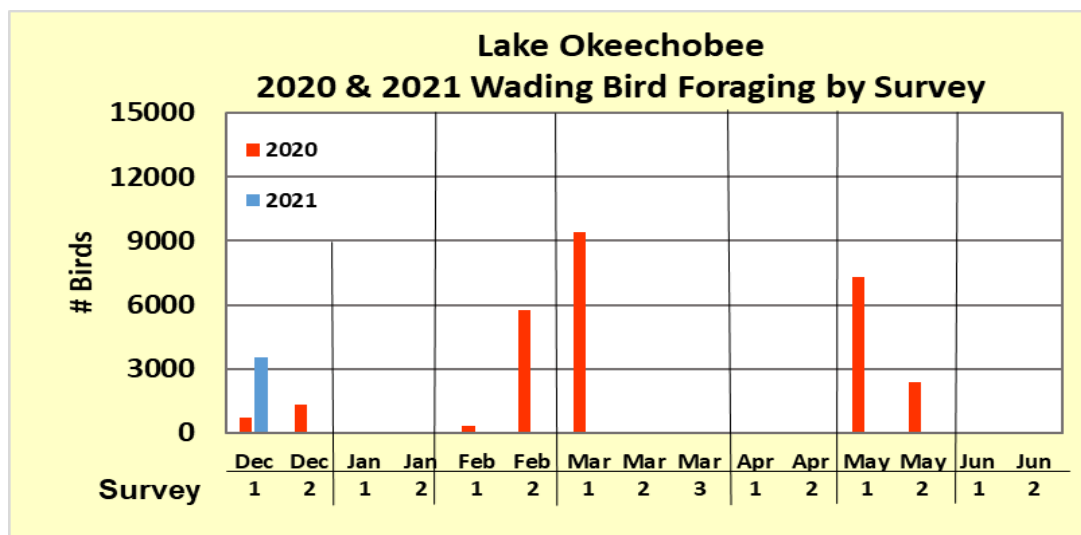
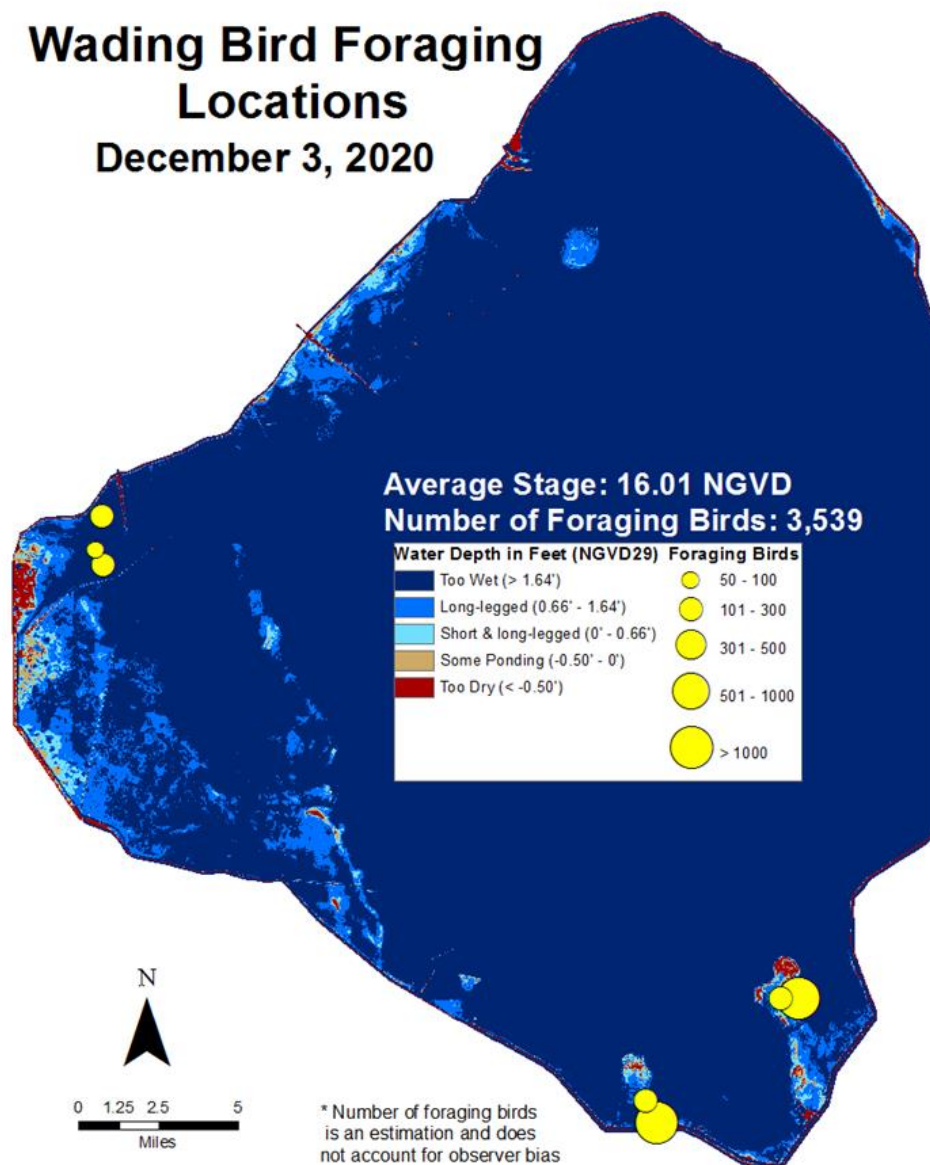
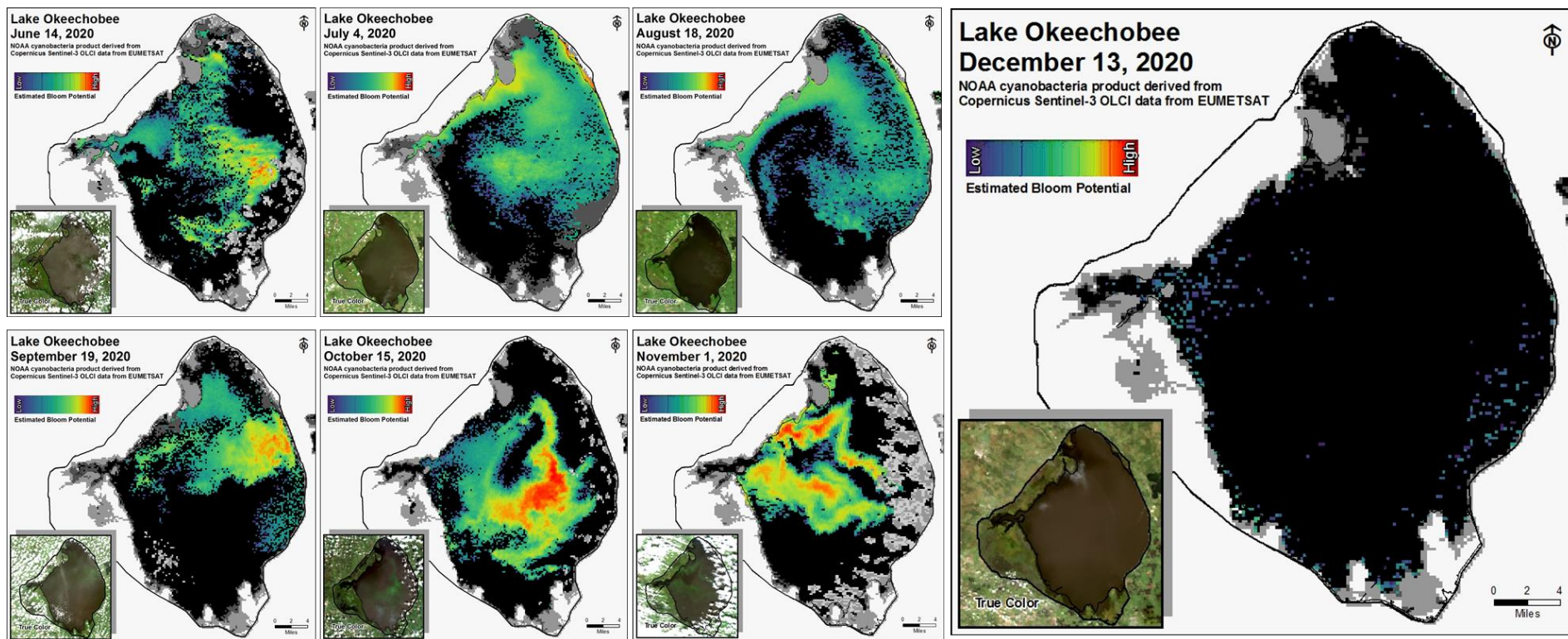


Figure 5. Major inflows (orange) and outflows (blue) of Lake Okeechobee, including the S-350 structures designated as South (green). The L-8 Canal flows through Culvert 10A are included as outflows when positive, and as inflows when backflowing into the Lake. All inflows and outflows are shown as positive and negative, respectively, for visual purposes. Outflows through the S-77 and S-308 structures are shown based on their downstream gauges to account for lock openings for navigation.

# Wading Bird Foraging Locations December 3, 2020



**Figure 6.** Locations of foraging flocks of wading birds observed during a monitoring flight on December 3, 2020 are shown in yellow, with circle sizes representing the size of the flocks. Previous survey totals from last year's breeding season are compared in the bar graph.



**Figure 7.** Cyanobacteria bloom potential based on NOAA's harmful algal bloom monitoring system. Gray color indicates cloud cover.

## **ESTUARIES**

### **St. Lucie Estuary:**

Last week total inflow to the St. Lucie Estuary averaged more than 1,739 cfs (Figures 1 and 2), and last month inflow averaged more than 2,594 cfs. Note these numbers do not include contributions from the Gordy Road Structure due to missing data. Last week's provisional averaged inflows from the tidal basin and the structures are shown in Table 1. (Note: Recorder at Gordy Road structure was removed due to bridge construction)

**Table 1.** Weekly average inflows (data are provisional).

<b>Location</b>	<b>Flow (cfs)</b>
Tidal Basin Inflow	290
S-80	1080
S-308	1229
S-49 on C-24	126
S-97 on C-23	243
Gordy Rd. structure on Ten Mile Creek	Not reporting

Over the past week, surface salinity increased throughout the estuary (Table 2, Figures 3 and 4). The seven-day moving average of the water column (an average of the surface and bottom salinity) at the US1 Bridge is 8.8. Salinity conditions in the middle estuary are estimated to be within the fair range for adult eastern oysters (Figure 3).

**Table 2.** Seven-day average salinity at three monitoring sites in the St. Lucie Estuary. Current average is in bold face type, previous average in parentheses. The envelope reflects the preferred salinity range for adult eastern oysters (*Crassostrea virginica*) in the middle estuary.

<b>Sampling Site</b>	<b>Surface</b>	<b>Bottom</b>	<b>Envelope</b>
HR1 (North Fork)	<b>4.5</b> (1.7)	<b>7.1</b> (2.8)	NA <sup>1</sup>
US1 Bridge	<b>7.0</b> (4.2)	<b>10.6</b> (7.9)	10.0-26.0
A1A Bridge	<b>14.2</b> (11.3)	<b>20.9</b> (21.4)	NA <sup>1</sup>

<sup>1</sup>Envelope not applicable

### **Caloosahatchee Estuary:**

Last week total inflow to the Caloosahatchee Estuary averaged approximately 5,204 cfs (Figures 5 and 6), and last month inflow averaged about 6,002 cfs. Last week's provisional averaged inflows from the structures and the tidal basin are shown in Table 3.

**Table 3.** Weekly average inflows (data is provisional).

<b>Location</b>	<b>Flow (cfs)</b>
S-77	2,752
S-78	3,298
S-79	4,880
Tidal Basin Inflow	324

Over the past week in the estuary, surface salinity remained the same to Ft. Myers Yacht Basin, decreased at Cape Coral, and increased downstream (Table 4, Figures 7 & 8). The seven-day average salinity values are within the poor range for adult eastern oysters at Cape Coral and in the good range at Shell Point and at Sanibel (**Figure 9**). The seven-day average surface salinities (Table 4) are in the good range (0-10) for tape grass at Val I-75 and at Ft. Myers.

**Table 4.** Seven-day average salinity at six monitoring stations in the Caloosahatchee Estuary. Current average is in bold, previous average in parentheses. The envelope at Val I-75 is for the protection of tape grass in the upper estuary and the envelope in the lower estuary reflects the preferred salinity range for adult eastern oysters (*Crassostrea virginica*).

Sampling Site	Surface	Bottom	Envelope
S-79 (Franklin Lock)	<b>0.2</b> (0.2)	<b>0.2</b> (0.2)	NA <sup>1</sup>
Val I75	<b>0.2</b> (0.2)	<b>0.2</b> (0.2)	0.0-5.0 <sup>2</sup>
Ft. Myers Yacht Basin	<b>0.2</b> (0.2)	<b>0.2</b> (0.2)	NA
Cape Coral	<b>1.3</b> (1.6)	<b>1.9</b> (2.5)	10.0-30.0
Shell Point	<b>14.4</b> (14.2)	<b>16.5</b> (17.1)	10.0-30.0
Sanibel	<b>24.2</b> (23.7)	<b>25.5</b> (25.5)	10.0-30.0

<sup>1</sup>Envelope not applicable and <sup>2</sup>Envelope is based on a 2-week forecast 30-day average

Forecast of surface salinity (Table 5 and Figure 10) at Val I-75 for the next two weeks using the autoregression model (Qiu and Wan, 2013), coupled with a linear reservoir model for the tidal basin, predicts daily salinity to be 0.3 or lower at the end of the two week period for pulse release at S-79 ranging from 0 to 800 cfs and estimated Tidal Basin inflows of 200 cfs. The 30-day moving average surface salinity at Val I-75 is forecast to be 0.3 or lower (Table 5). The current salinity conditions at Val I-75 are within the envelope of salinity 0.0-5.0 for this site (Table 4).

**Table 5.** Predicted salinity at Val I-75 at the end of forecast period

Scenario	Q79 (cfs)	TB runoff (cfs)	Daily salinity	30 day Mean
A	0	200	0.3	0.3
B	300	200	0.3	0.3
C	450	200	0.3	0.3
D	650	200	0.3	0.3
E	800	200	0.3	0.3

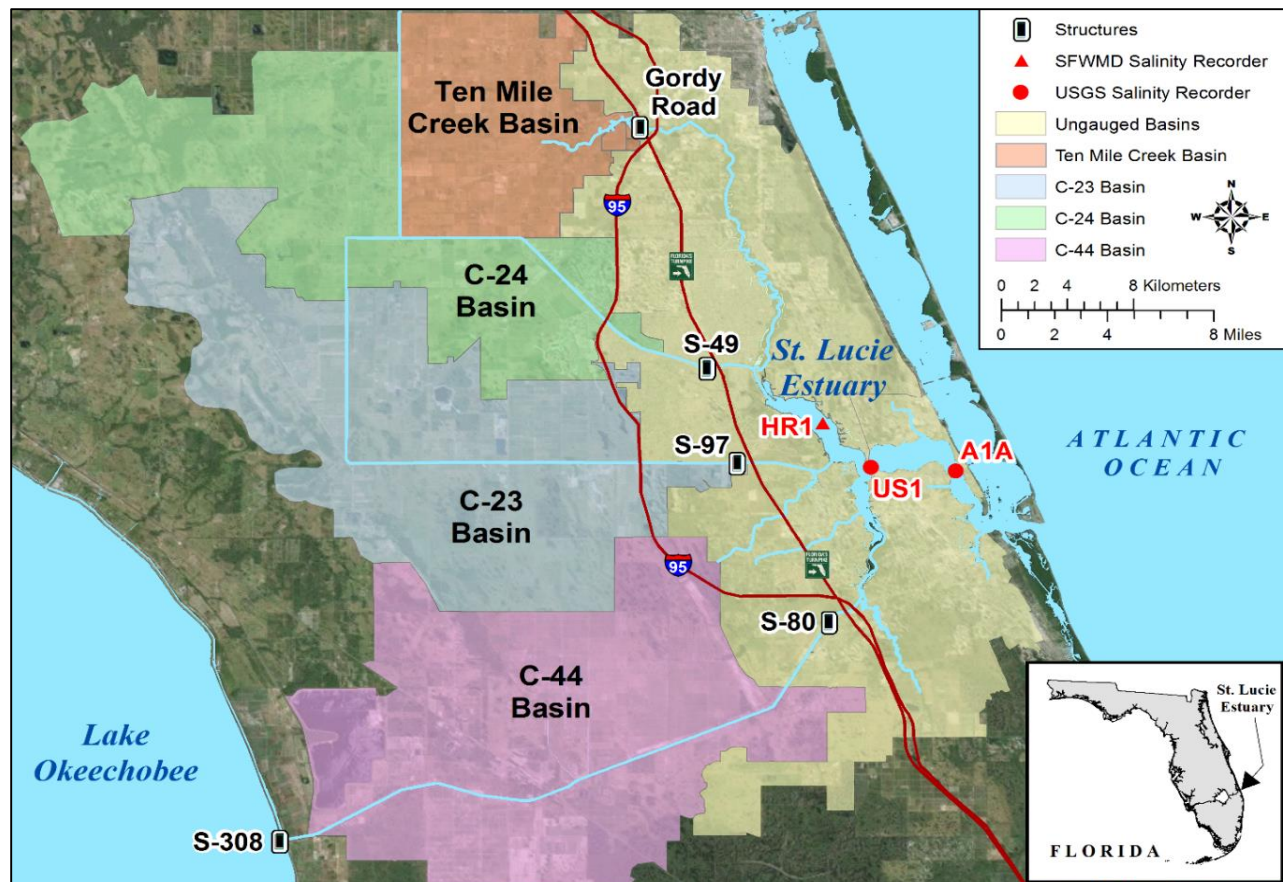
### Red tide

The Florida Fish and Wildlife Research Institute reported on December 11, 2020, that *Karenia brevis*, the Florida red tide dinoflagellate, was observed in background to high concentrations in 34 samples collected from and offshore of Lee County and was not observed in samples collected from St. Lucie, Martin, Palm Beach, or Broward counties (no samples were analyzed this week from Miami-Dade County).

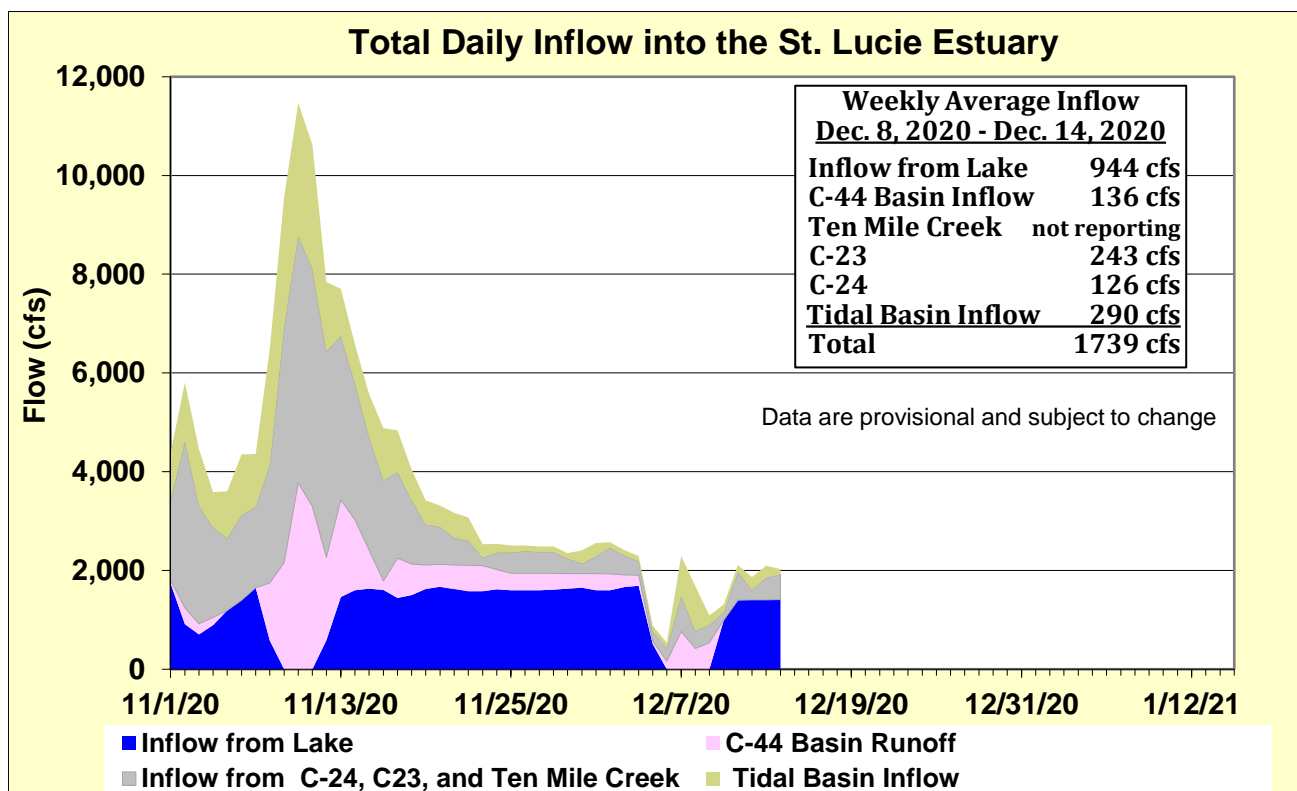
### Water Management Recommendations

Lake stage is in the Low Sub-Band. Tributary conditions are wet. The LORS2008 release guidance suggests up to 450 cfs release at S-79 to the Caloosahatchee Estuary and up to 200 cfs release at S-80 to the St. Lucie Estuary.



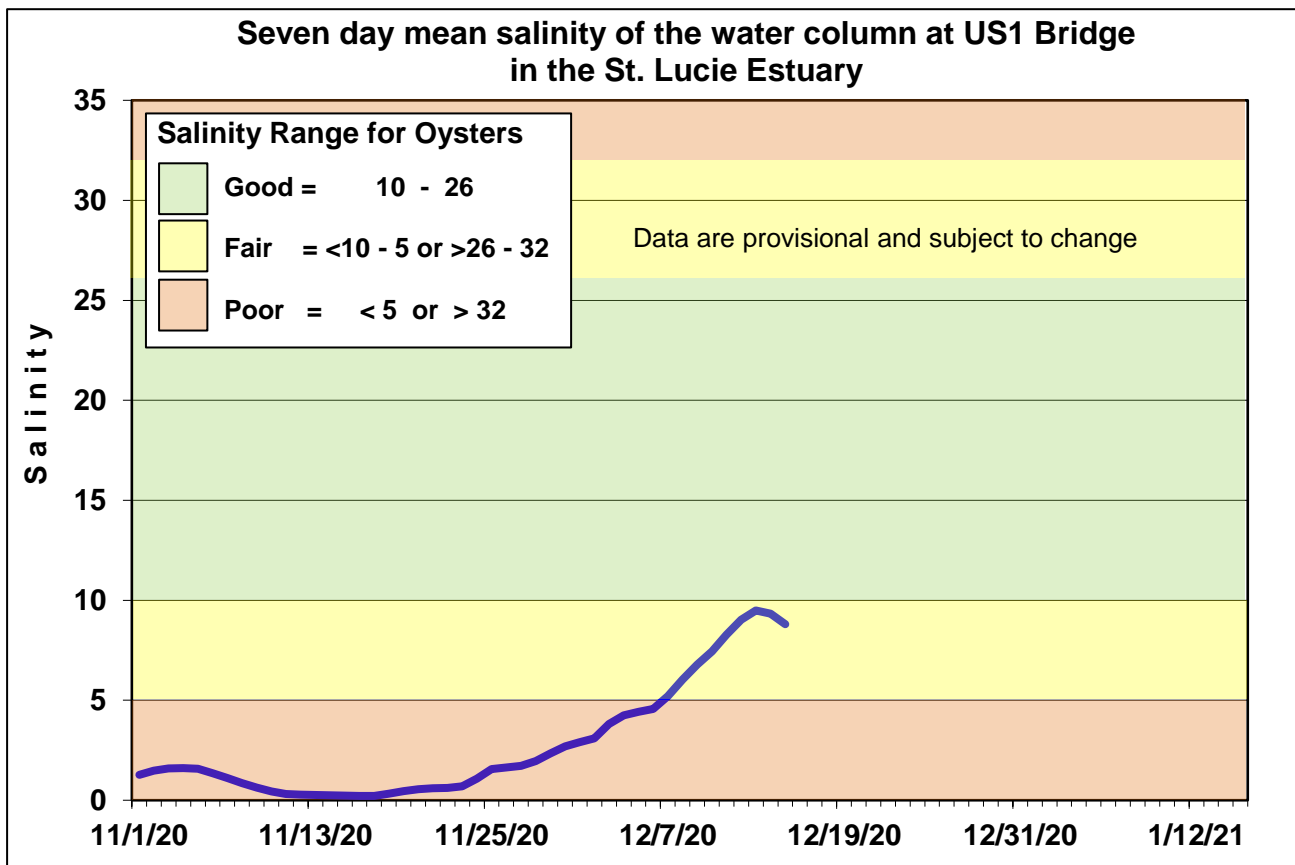


**Figure 1.** Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

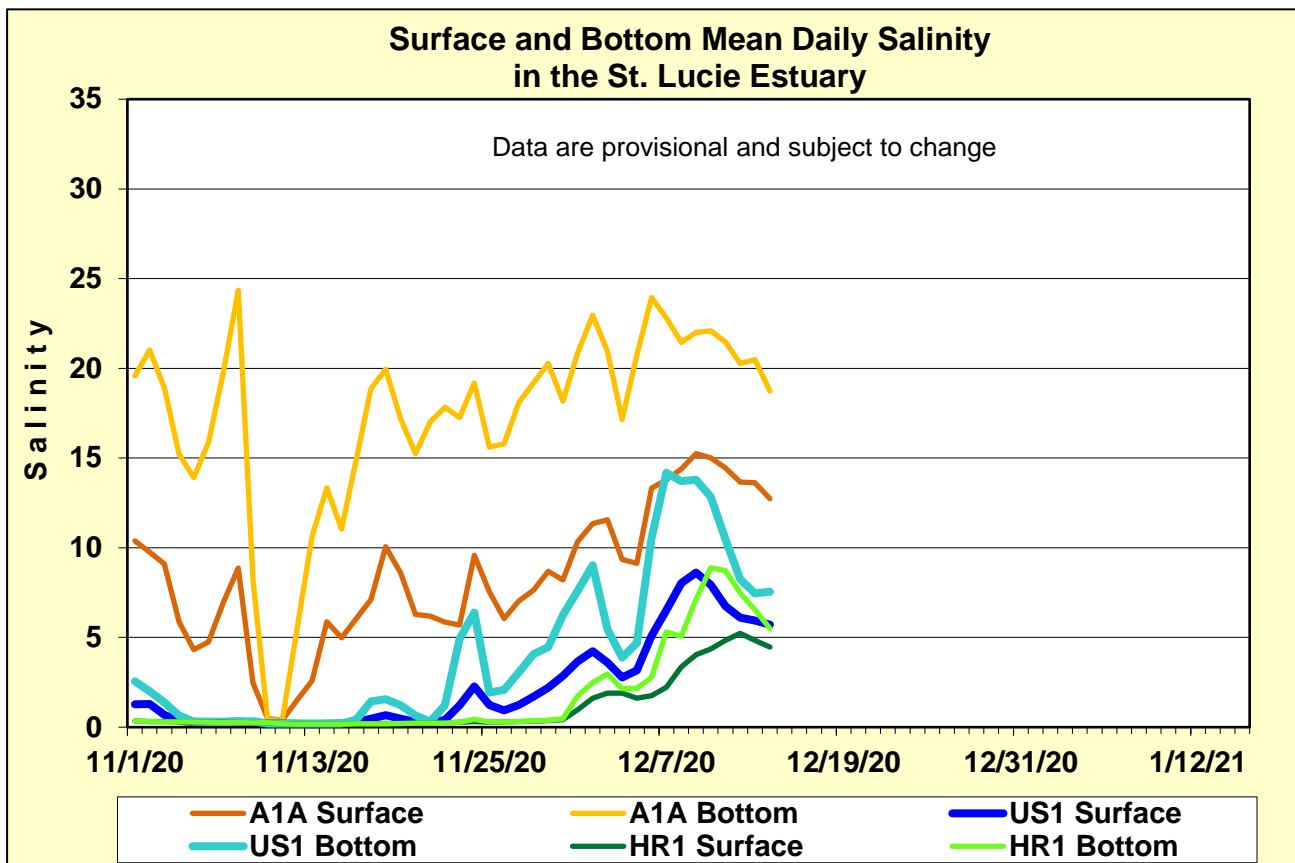


**Figure 2.** Total daily inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basin into the St. Lucie Estuary.





**Figure 3.** Seven-day mean salinity of the water column at the US1 Bridge.



**Figure 4.** Daily mean salinity at the A1A, US1, and HR1 stations.

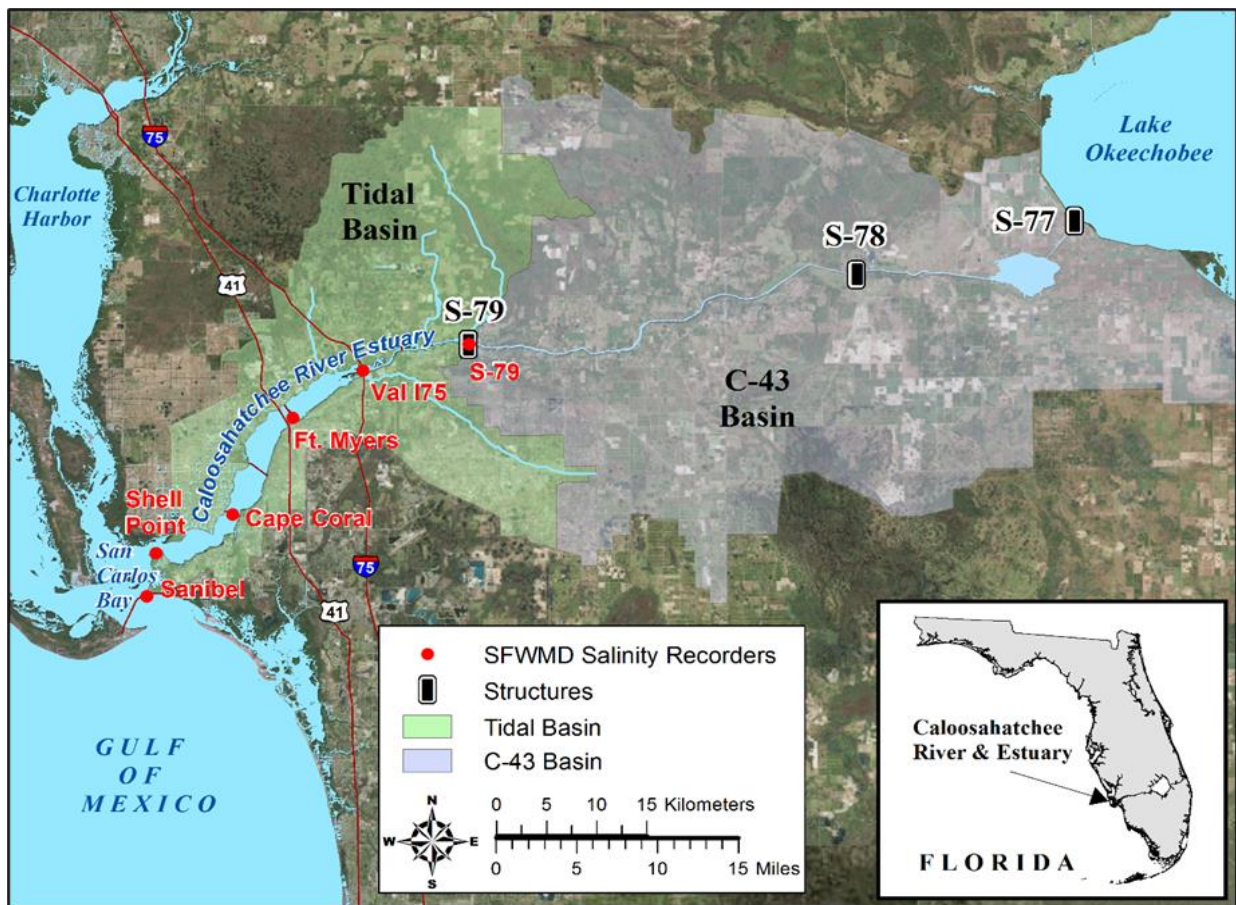


Figure 5. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

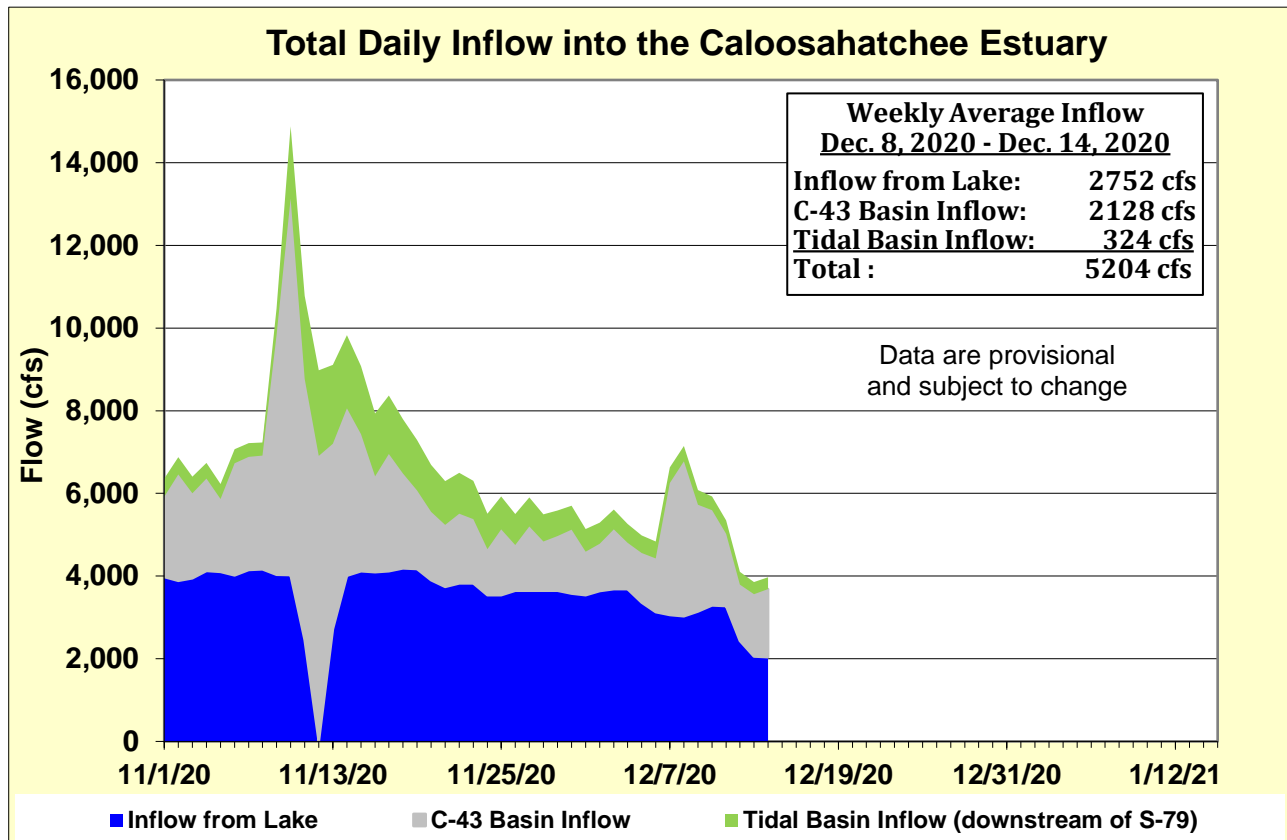
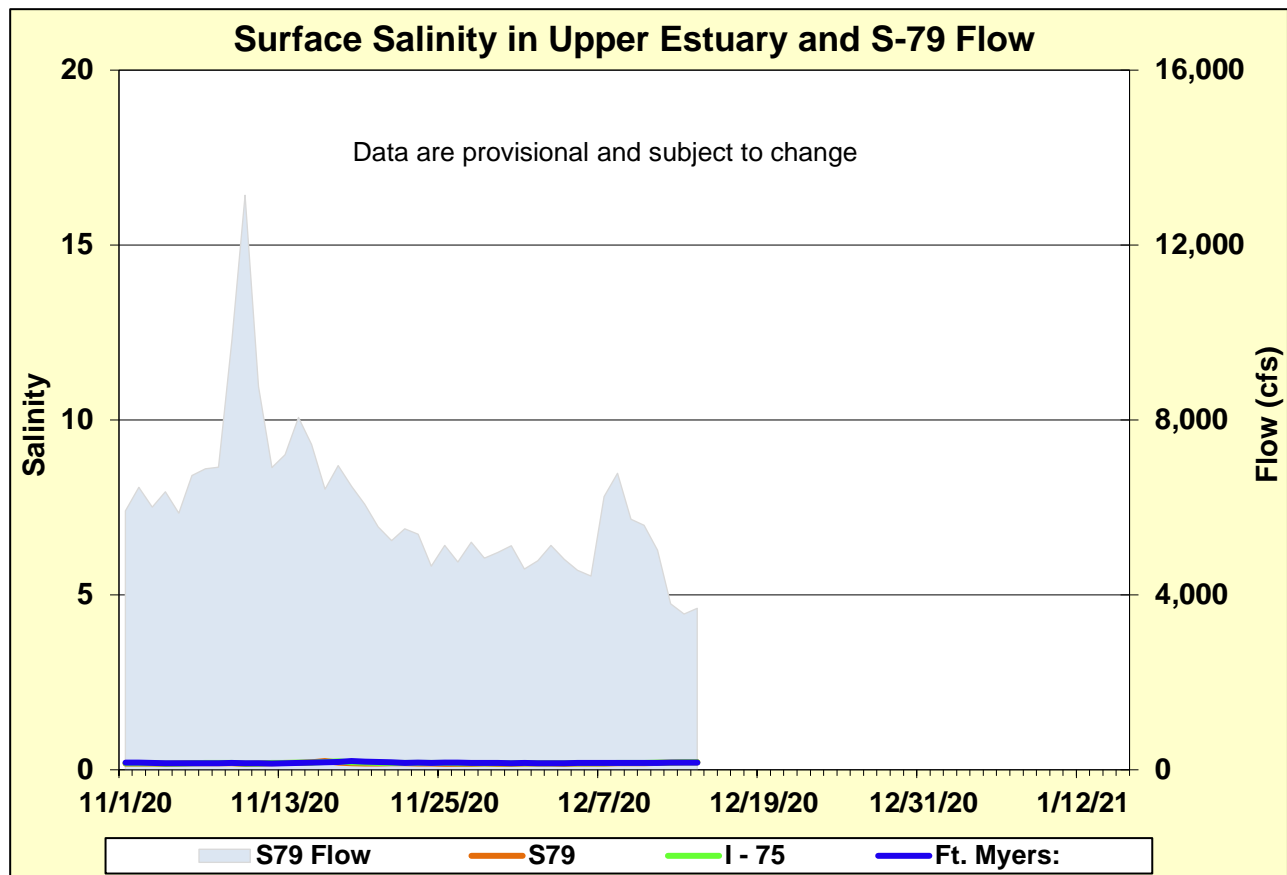
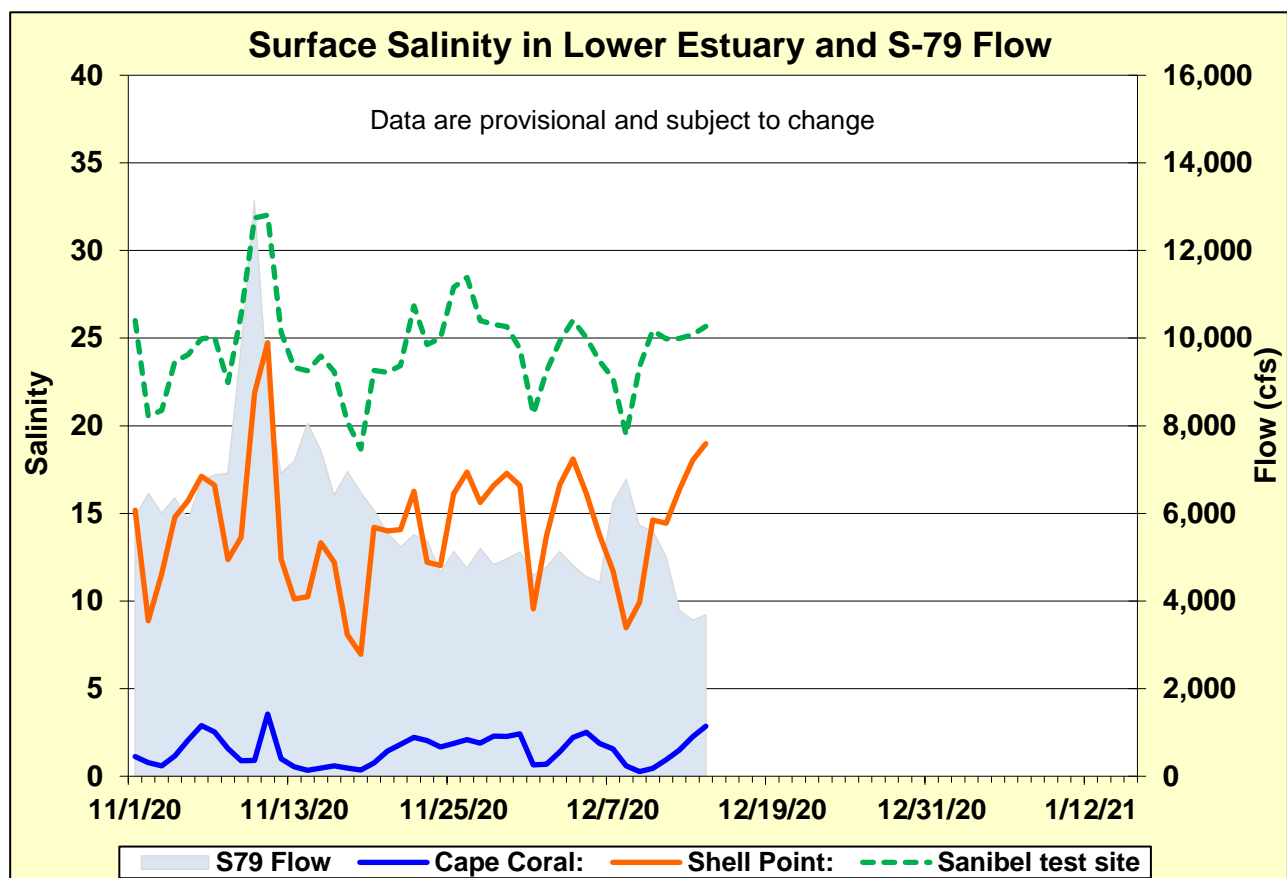


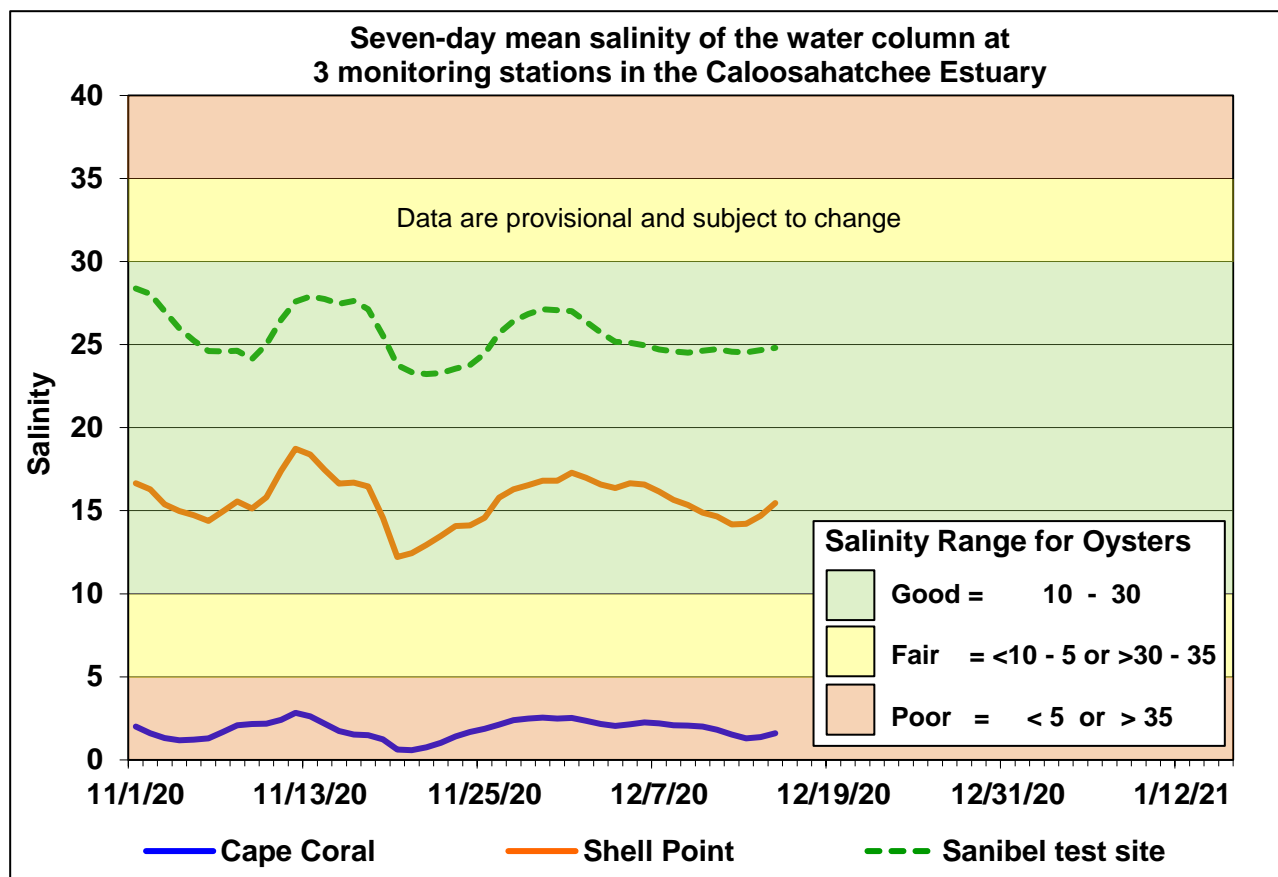
Figure 6. Total daily inflows from Lake Okeechobee, runoff from the C-43 basin, and tributaries in the tidal basin into the Caloosahatchee River Estuary.



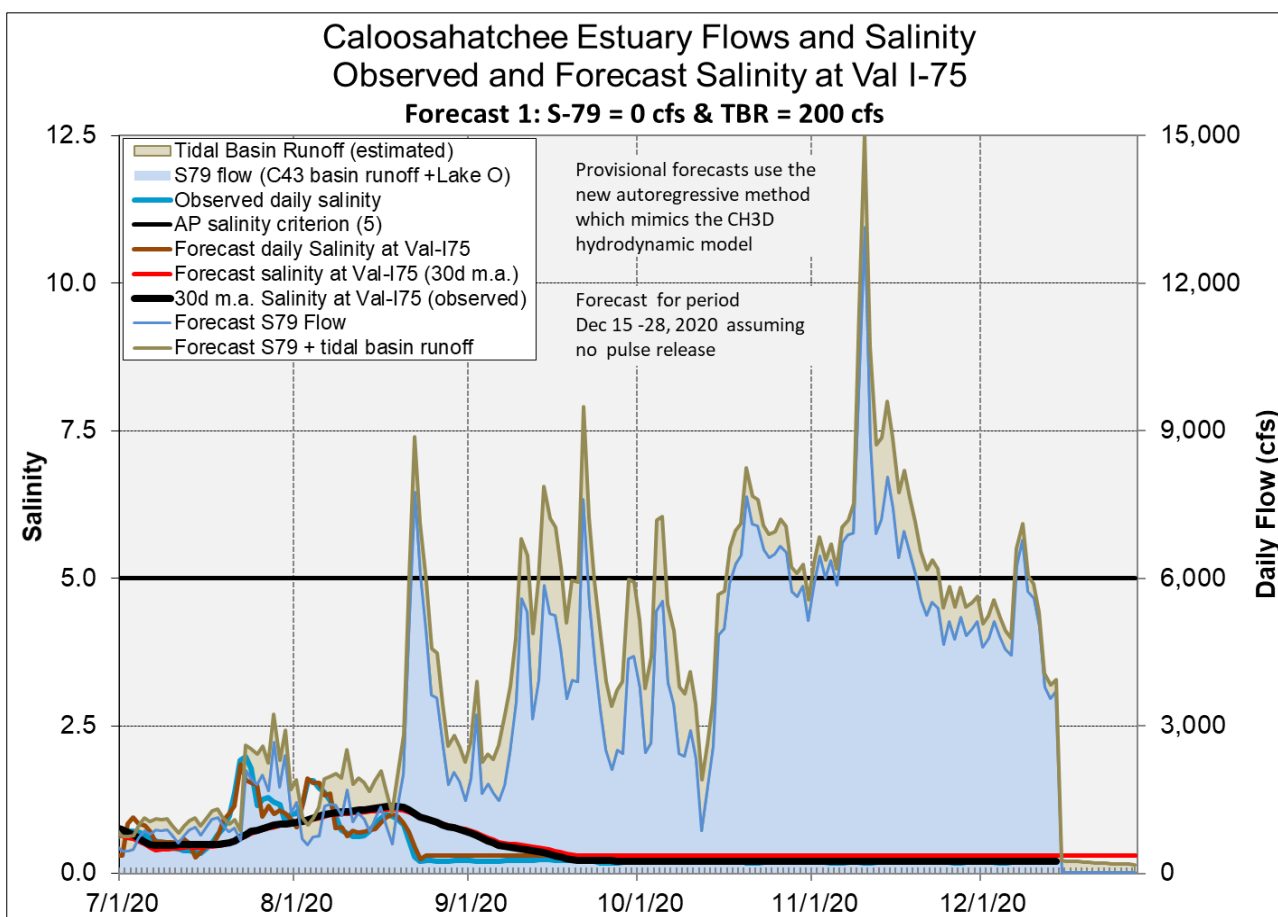
**Figure 7.** Daily mean flows at S-79 and salinity at upper estuary monitoring stations.



**Figure 8.** Daily mean flows at S-79 and salinity at lower estuary stations.



**Figure 9.** Seven-day mean salinity at Cape Coral, Shell Point, and Sanibel monitoring stations.

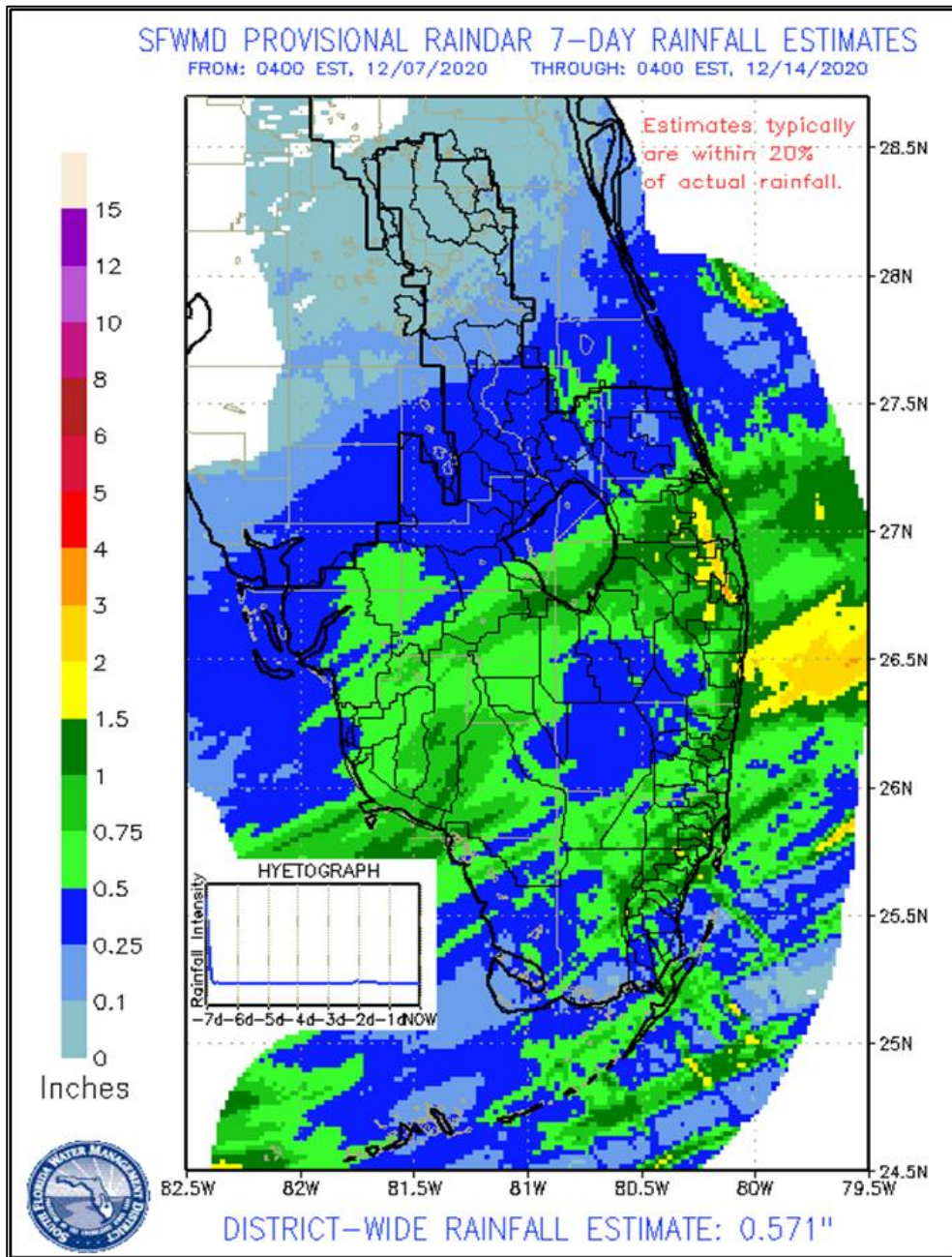


**Figure 10.** Forecasted Val I-75 surface salinity assuming no pulse release at S79.



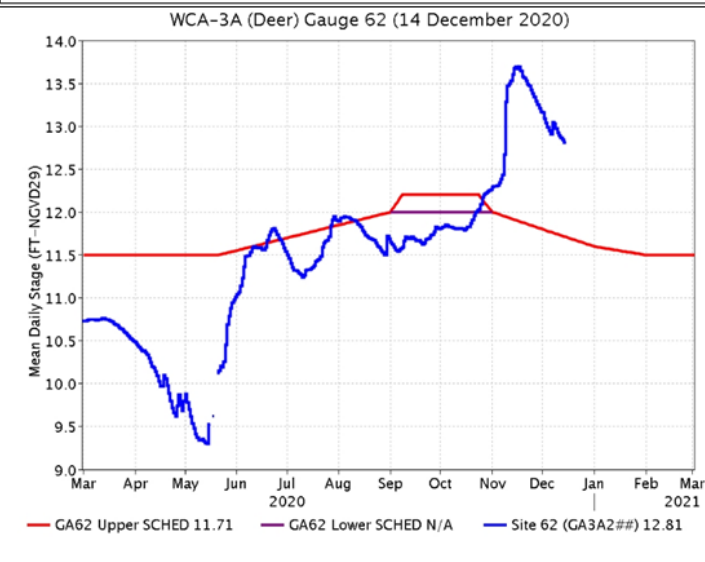
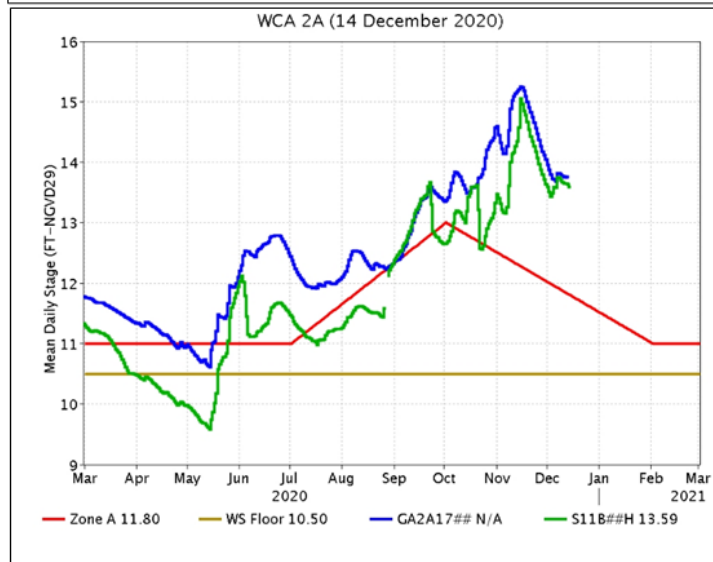
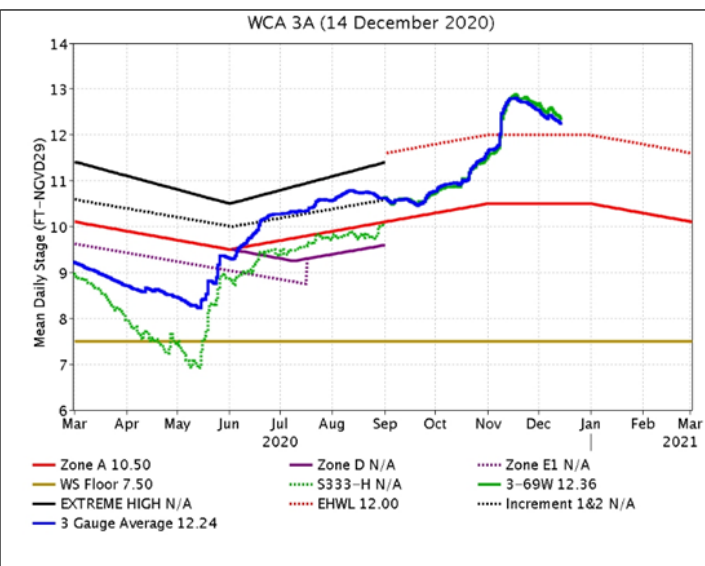
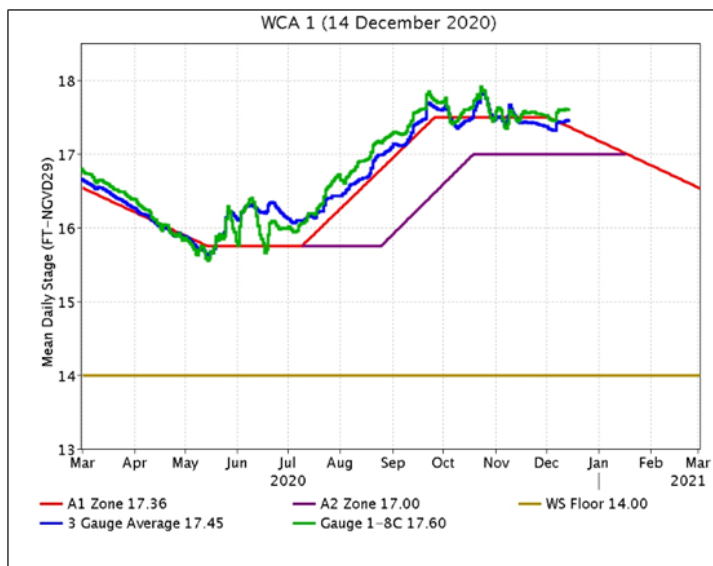
## EVERGLADES

Above average rainfall fell across the system last week. At the gauges monitored for this report, excluding inoperable gauge 2-17 in WCA-2A, stages remained unchanged on average, with stages generally rising in the north and falling in the south. Evaporation was 0.74 inches last week, and the Tamiami Trail Flow Formula (TTFF) continues to call for maximum releases from WCA-3A.



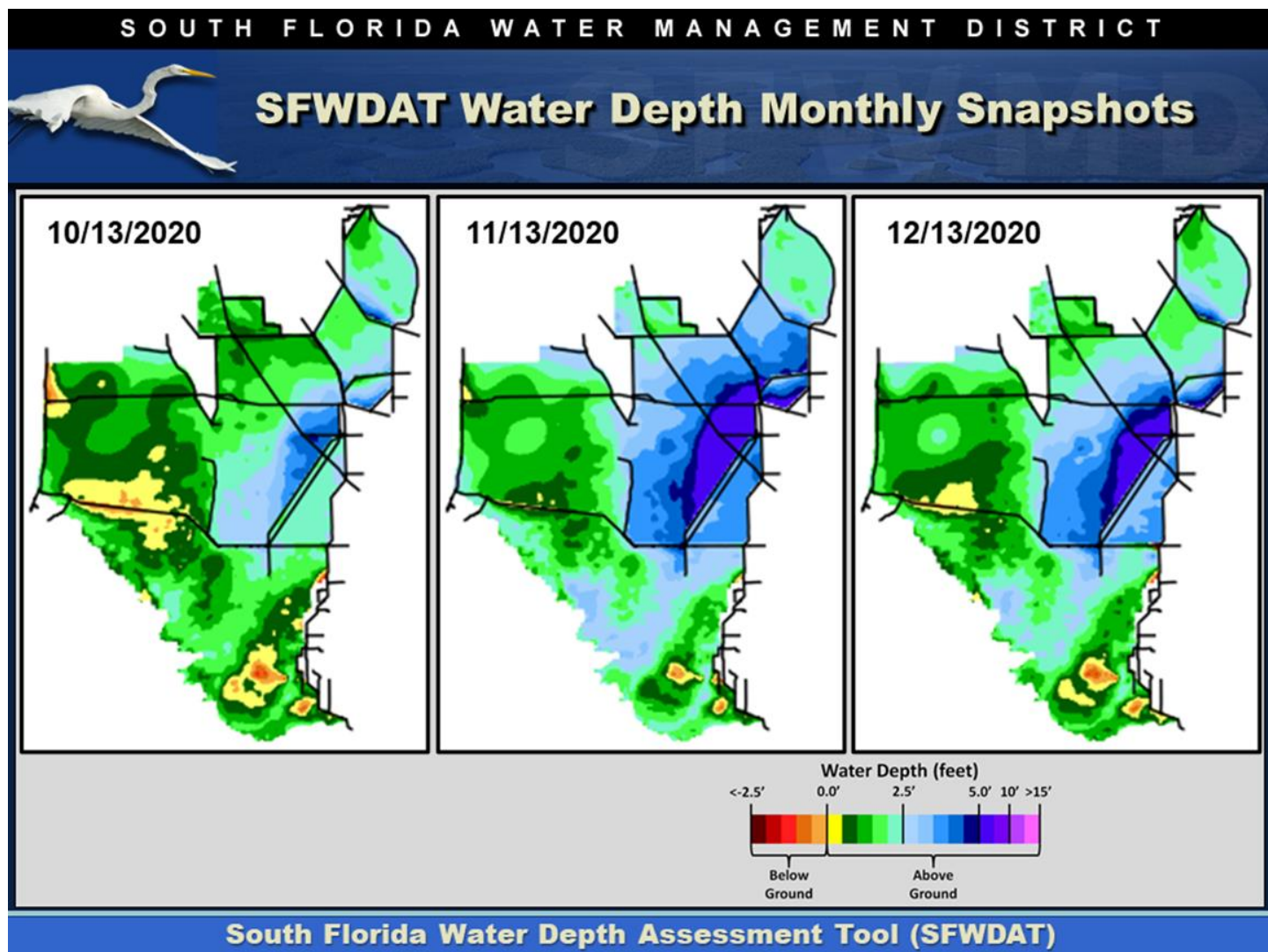
Everglades Region	Rainfall (Inches)	Stage Change (feet)
WCA-1	0.61	+0.14
WCA-2A	0.40	ERROR
WCA-2B	0.41	+0.01
WCA-3A	0.50	-0.07
WCA-3B	0.67	-0.04
ENP	0.49	-0.03

Regulation Schedules: WCA-1: Stage at the 1-8C Gauge is generally trending along with the schedule, currently 0.24 feet above the stable Zone A1 regulation line. WCA-2A: The recession in stage at Gauge 2-17 flattened last week generally paralleling the regulation line last week. WCA-3A: The Three Gauge Average stages continued to recede towards the stable Zone A regulation line last week, currently 1.74 feet above it and 0.24 feet above the Extreme High Water Line. WCA-3A: Stage at Gauge 62 (Northwest corner) receded last week remaining above the falling Upper Schedule by 1.1 feet.



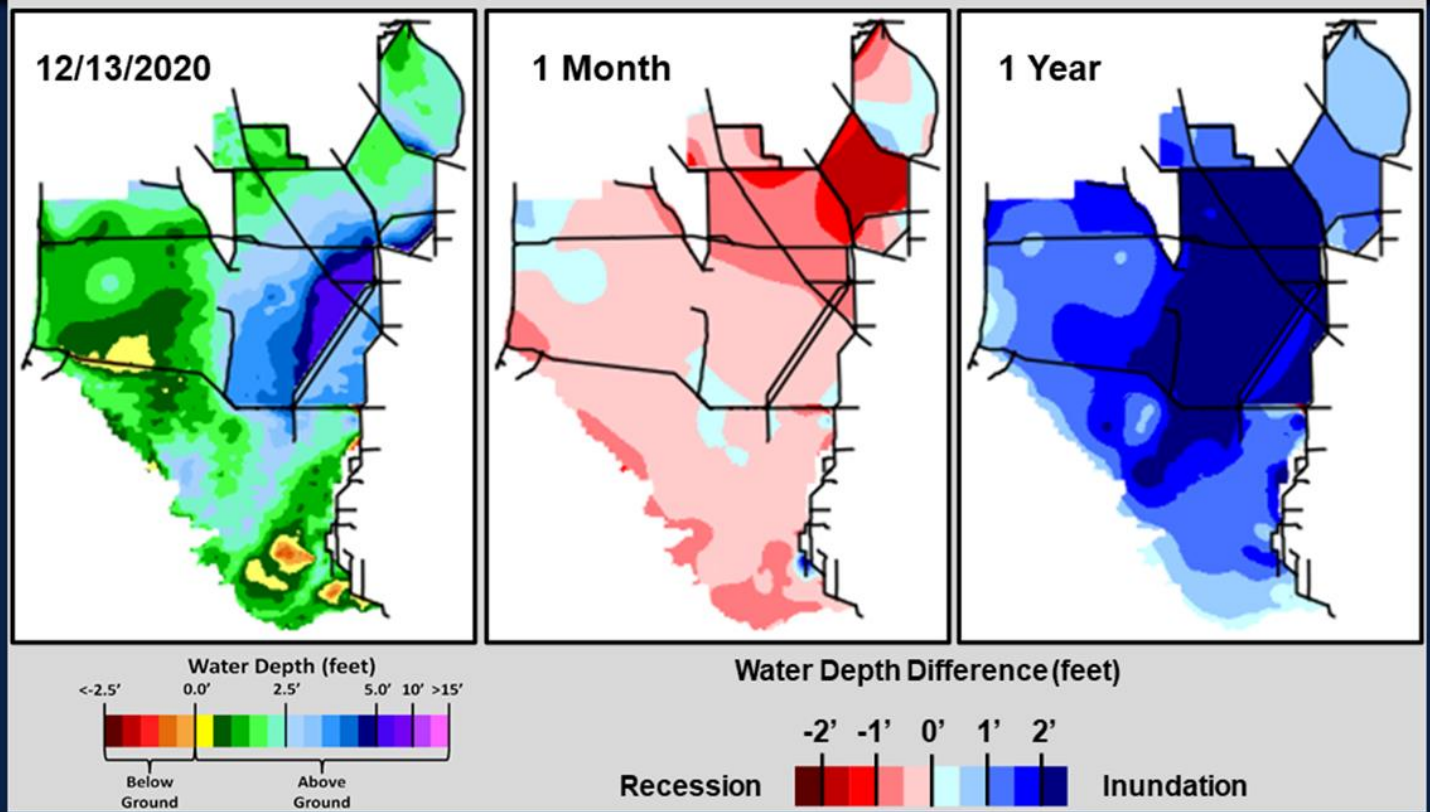


Water Depths: The WDAT tool for spatial interpolation of depth monthly snapshots over the last two months indicate current depths in excess of 5.0 feet in WCA-3A South around the upper reaches of the L-67 canal. Ponding depths (>2.5 feet) are retreating. The southeastern one-third of WCA-2A and the northwest corner and along the northern border of WCA-3A have the potential to be lower than 2.0 feet. Hydrologic connectivity remains well established within the major sloughs in Everglades National Park. Comparing WDAT water levels from present, over the last month stages fell significantly across most of the system, dramatically in WCA-2A. Looking back one year, the stage difference patterns are strikingly different than one month ago. Compared to one year ago the entire region is deeper than it was a year ago, more than 2.0 feet deeper across the entirety of WCA-3A, and 1.0 feet in WCA-2A.





## SFWDAT Everglades Difference Maps (Present – Past)

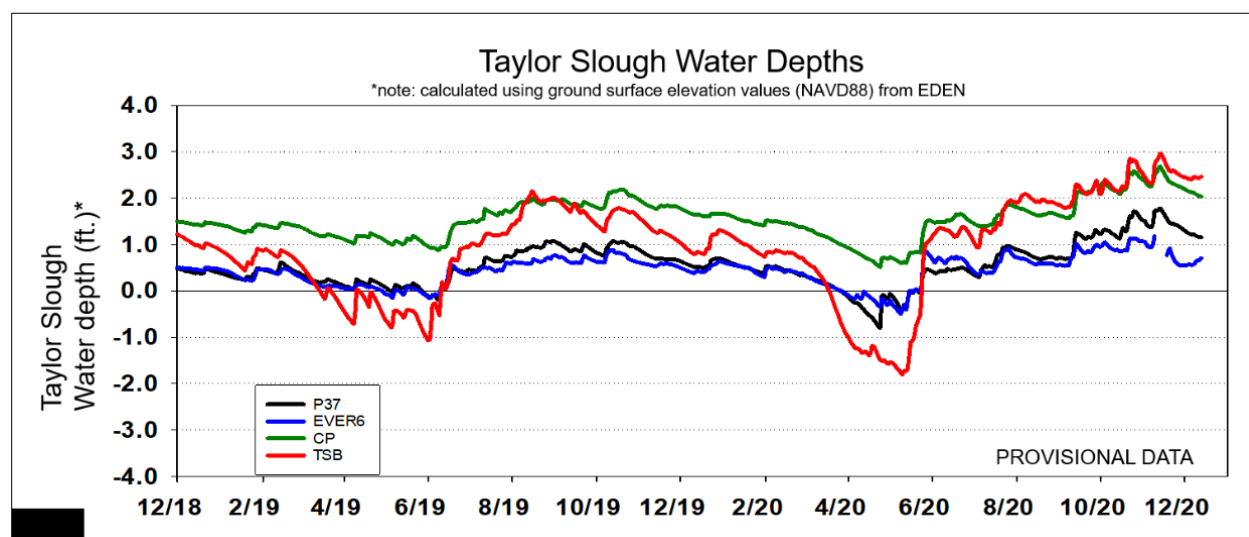
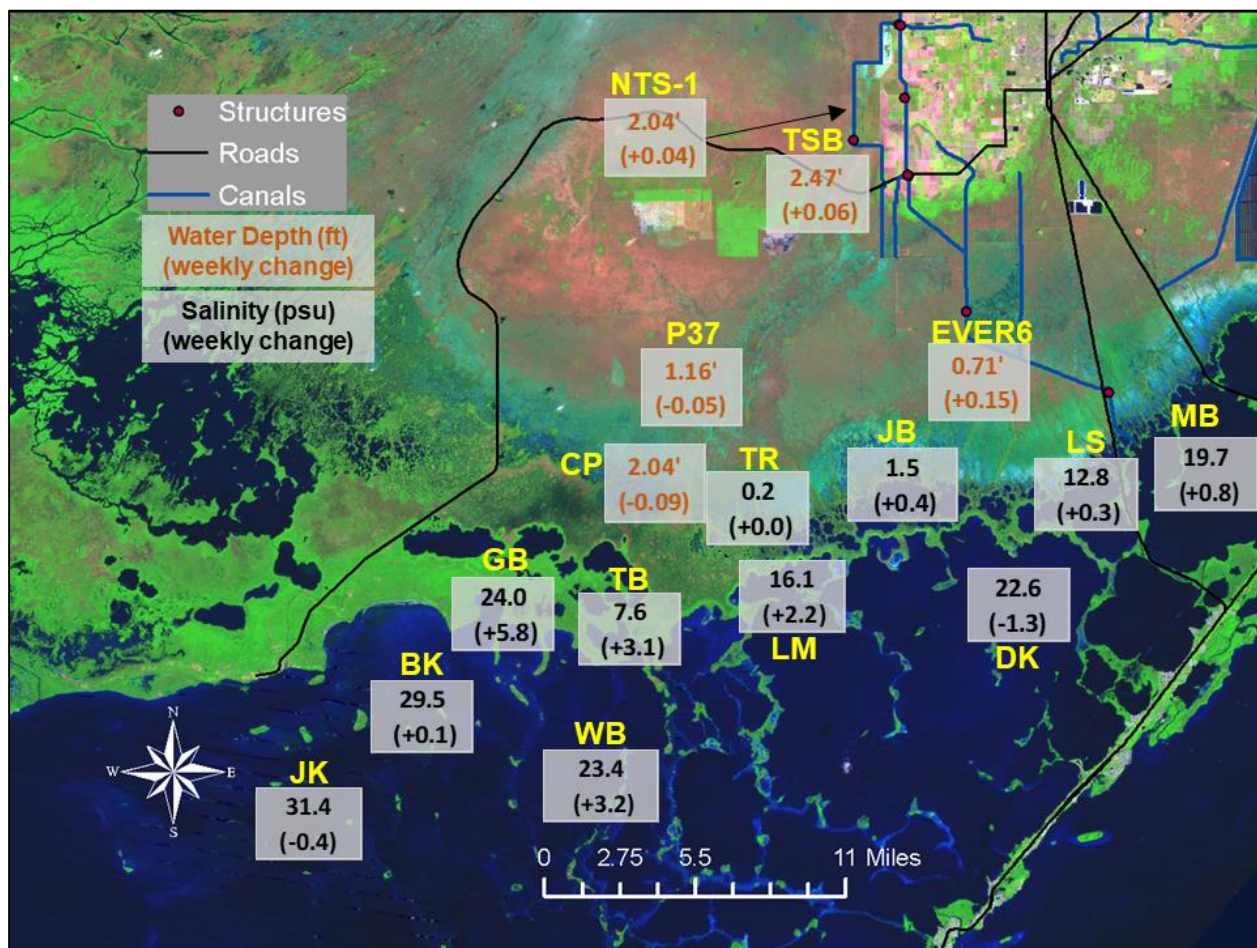


**South Florida Water Depth Assessment Tool (SFWDAT)**

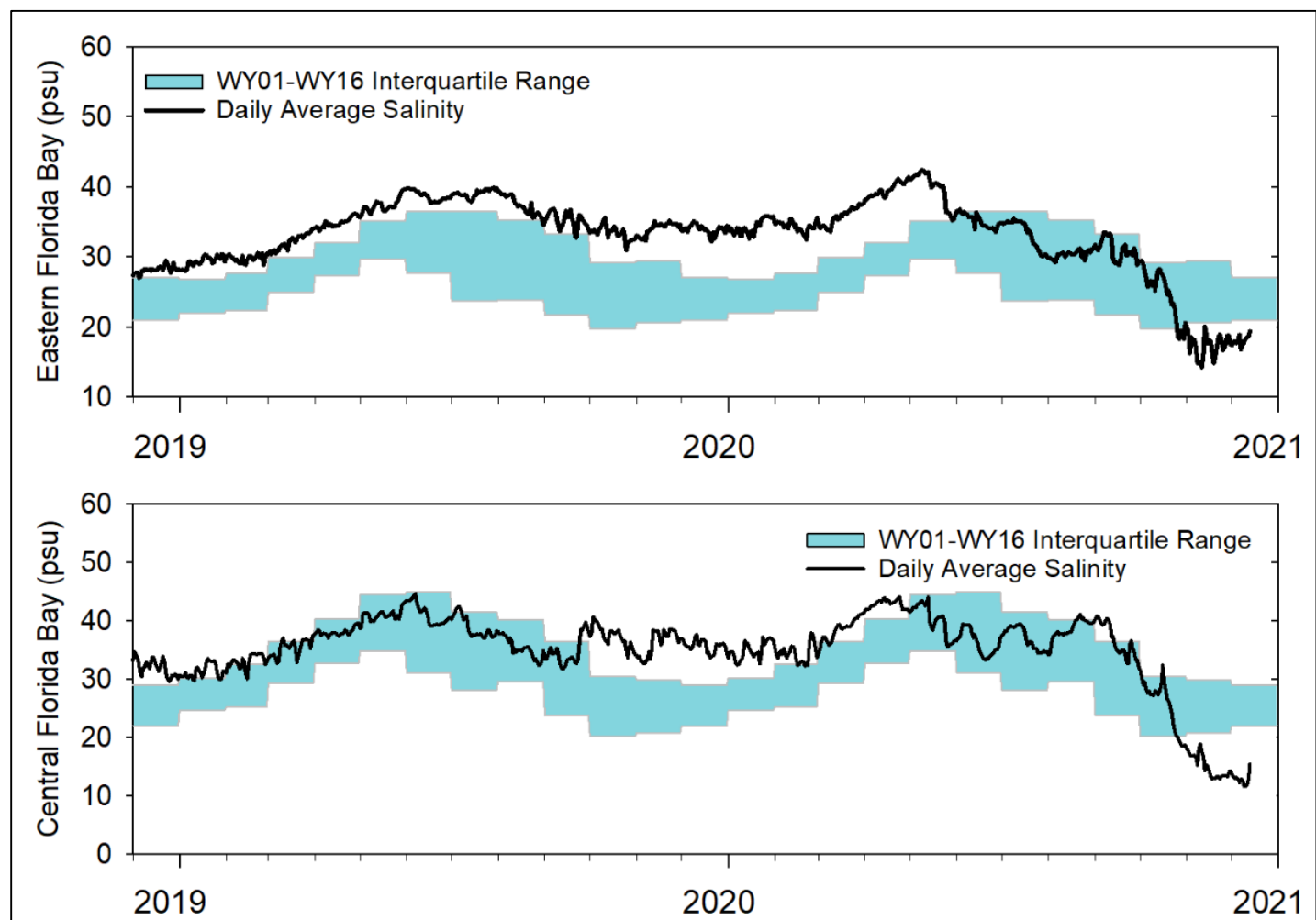
Tree island inundation in WCA-3A, WCA-3B and ENP: 371 Tree Islands of known elevation within WCA-3A, -3B, and Everglades National Park's Shark Slough. Current preliminary estimates using WDAT indicate that 88% or 327 of the tree islands are currently inundated, and 22% have been inundated for more than 120 days. Inundation for more than 120 days will cause ecological harm to sensitive islands.



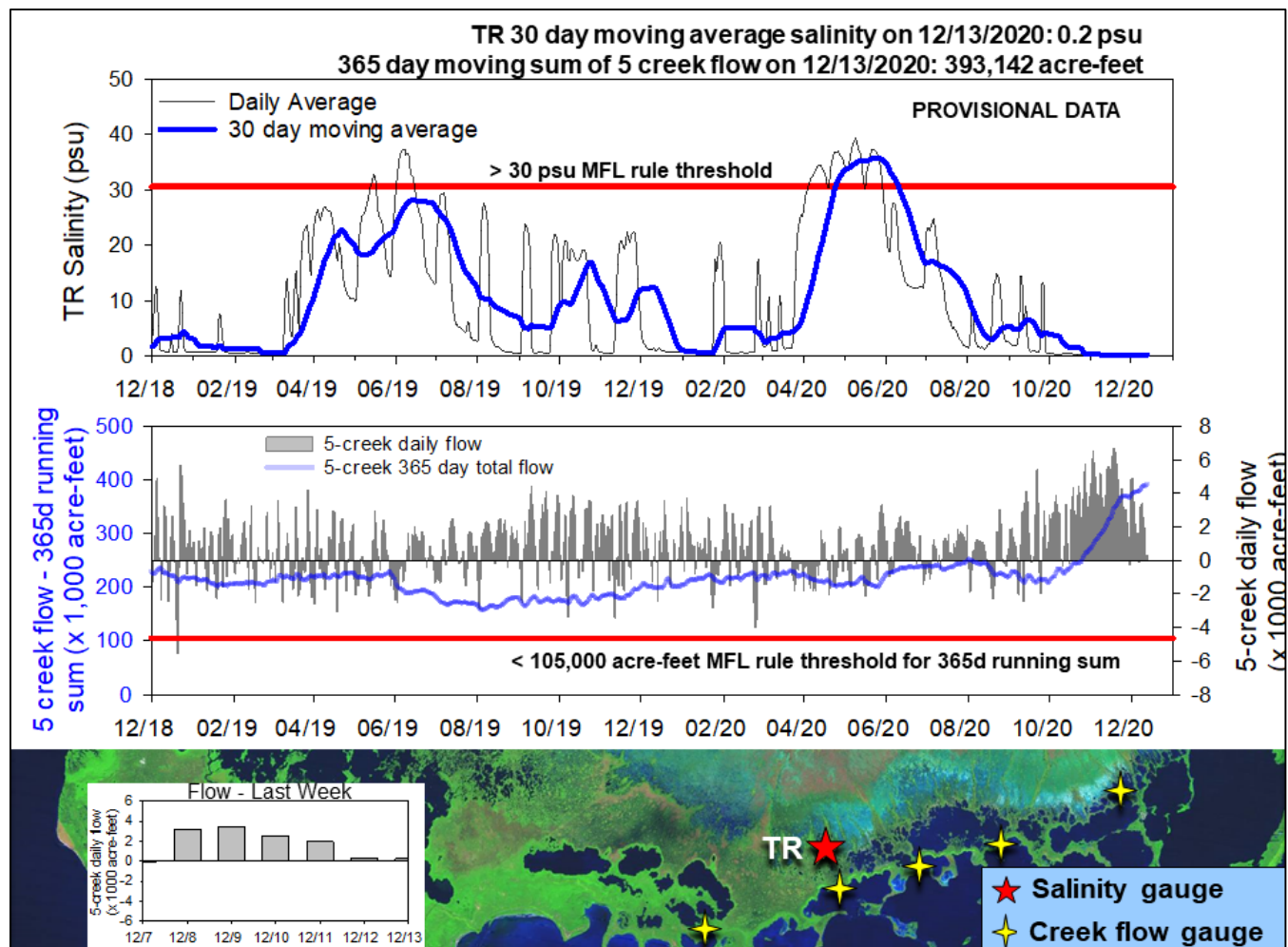
Taylor Slough Water Levels: An average of 0.71 inches of rain fell over Taylor Slough and Florida Bay this past week which allowed stages to increase 0.02 feet on average over the week. Taylor Slough is currently 10 inches above the historical average for this time of year, and the northern portion is 18 inches higher than the historical average. The stage increases are spatially located with the areas of highest rainfall (up to 1.39 inches for the week) and freshwater deliveries.



Florida Bay Salinities: Salinities in Florida Bay averaged a 1.5 increase over the week, as bay-wide salinities respond to decreasing freshwater input. Average salinity for the Bay is 5 lower than the historical average for this time of year. S-197 was closed on 12/11 ending the flows into Manatee Bay (MB).



Florida Bay MFL: The salinity at the TR station in the mangrove zone (tracked for the Florida Bay MFL) has continued to be near fresh (less than 0.3), and the 30-day moving average has also remained low at 0.2. Weekly flow from the 5 creeks, identified by yellow stars on the map, totaled just over 11,600 acre-feet (down from 18,000 acre-feet last week). Daily flows had a single day of negative flows before resuming positive flows for the rest of the week. The 365-day moving sum of flow from the five creeks (tracked as part of the Florida Bay MFL criteria) ended at 393,142 acre-feet this week, which is a 13,000 acre-feet increase from last week. That is higher than the 90th percentile of historical data (390,830 acre-feet). This is a value not seen since October of 2012. Creek flows are provisional USGS data.



### Water Management Recommendations

Moderating rapid changes in stage to less than plus or minus 0.25 feet per week or 0.50 feet per two weeks has ecological benefit.

Stages in WCA-2A have fallen nearly 1.5 feet over the last three weeks. Moderating and maintaining that recession rate to near the seasonal rate of -0.05 to -0.09 feet per week, now that the stage at the 2-17 gauge is below 14.0 NGVD, has ecological benefit into the dry season.

At this early point in the dry season, maintaining the recession where possible in WCA-3A South, even when faster than traditional (between -0.05 and -0.09 feet per week) ecological recession rate recommendations, has ecological benefit as long as there is no downstream deleterious ecological impact. Extreme high-water conditions call for the utilization of any and all sources of discharge from WCA-3A.



Ponding along the L-67 canal/levee system may have peaked and is now subsiding. However, inundation of the tree islands in that region and east into central WCA-3A South has now persisted for more than 120 days, which creates ecological harm in regions containing sensitive islands. Managing inflows/outflows within that region that decreases ponding in both spatial extent and the amount of time the region is inundated has benefit to the ecology of tree islands. When considering the status of tree islands in WCA-3A as a whole, the last two years of low flooding stress created a resilience to flooding stress for a single wet season. However, the current inundation pattern and duration is forcing many animals to flee to the surrounding levees and others to delay breeding activities. If these high stages should persist long into the dry season, ecological harm is likely. But, given the low precipitation predictions for the upcoming dry season, this persistence seems unlikely as long as the District continues to maximize flows south. Once conditions move closer to average, SFWMD Everglades ecologists recommend a careful conservation of water in WCA-3A.

Continued flows towards Taylor Slough and Florida Bay maintain hydration in the marshes, lower salinity conditions within the nearshore areas of Florida Bay, and provide a freshwater buffer against the drier than average dry season that is expected. Hydration will delay the start of the salinity increases that occur within the dry season and possibly prevent the occurrence of extreme hypersalinity towards the end of the dry season.

More specific recommendations appear in the summary table below. The red text represents new or modified information or recommendations.

## SFWMD Everglades Ecological Recommendations, December 14th, 2020 (red is new)

Area	Weekly change	Recommendation	Reasons
WCA-1	Stage increased by 0.14'	Maintain marsh stage slightly above and parallel to the regulation schedule.	Protect within basin and downstream habitat and wildlife.
WCA-2A	N/A	Moderate the recession rate to maintain marsh stage above and parallel to the falling regulation schedule.	Protect within basin and downstream habitat and wildlife from flooding stress.
WCA-2B	Stage increased by 0.01'	Maintain a recession rate to lower marsh stage.	Protect within basin and downstream habitat and wildlife from flooding stress.
WCA-3A NE	Stage decreased by 0.11'	Maintain and moderate the recession rate to return marsh stage to more average conditions.	Protect within basin and downstream habitat and wildlife from flooding stress.
WCA-3A NW	Stage decreased by 0.06'	Maintain a recession rate to return marsh stage to more average conditions.	
Central WCA-3A S	Stage decreased by 0.06'	Maintain a recession rate to return marsh stage to more average conditions.	Protect within basin, upstream/downstream habitat and wildlife. Tree island ecology is diminished by flooding
Southern WCA-3A S	Stage decreased by 0.04'		
WCA-3B	Stage decreased by 0.04'	Maintain the recession rate to lower marsh stage.	Protect within basin and downstream habitat and wildlife from flooding stress.
ENP-SRS	Stage decreased by 0.03'	Make discharges to the Park according to the current deviation with a return to COP protocol as soon as high water conditions are alleviated in the upstream WCAs	Protect within basin and upstream habitat and wildlife from flooding stress.
Taylor Slough	Stage changes ranged from -0.09' to +0.15'	Move water southward as possible	When available, provide freshwater buffer for downstream conditions.
FB- Salinity	Salinity changes ranged -1.3 to +5.8 psu	Move water southward as possible	When available, provide freshwater to maintain low salinity buffer and promote water movement.